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THE BRITISH CYNIPOIDEA
(HYMENOPTERA)
DESCRIBED BY P. CAMERON



J. QUINLAN

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 31 No. 1
LONDON : 1974

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SYNOPSIS

The British species of Cynipoidea described by P. Cameron are re-classified. Five new combinations and seven new specific synonyms are established. Twelve lectotypes and five neotypes are designated. Nine specific names are at present *nomina dubia*.

INTRODUCTION

CAMERON described 50 British species of Cynipoidea during the period 1875-89. Most of these species have been variously referred to by European workers but some have remained unrecognized. Before further progress could be made with the preparation of keys to the British Cynipoidea in the *Handbooks for the Identification of British Insects* series it became necessary to study the type-material of Cameron's species and to correlate it with the original descriptions. The type-specimens of 36 of these species have been located in the British Museum (Natural History) (hereafter abbreviated to BMNH); of the remaining 14 species, neotypes have been designated for five and nine remain *nomina dubia*.

Three Cameron collections are to be found in the BMNH. One bears the registration label '1886-3' and is a collection of galls and gallflies purchased from Cameron and collected mainly in Europe. The second collection bears the registration label 'Cameron 1896-76' and was presented to the BMNH by F. D. Godman; the Museum Register states that this collection consisted of Tenthredinoidea and

Cynipoidea, '618 sps., 141 types, 391 microscope slides, 103 larvae and 242 drawings'. The third collection has the registration label '1914-110'.

In preparing this paper I have contacted the following British and European Museums in order to ensure, as far as possible, that no type-material of Cameron's British Cynipoidea has been overlooked: Leicester Museum; Royal Scottish Museum, Edinburgh; University Museum, Oxford; Természettudományi Múzeum, Budapest. Most of these museums have kindly loaned me material that might have contained the Cameron material for which I was looking. During the course of this study I have traced where possible the collections of Thomas Richard Billups, the Rev. Thomas Anself Marshall and Eduard Arthur Fitch, who were contemporaries of Cameron and in a few instances the actual collectors of species described by him.

Cameron's British Cynipoidea are all mounted on rectangular cards. Many of them have been remounted by various people on similar rectangular cards, but in most such cases the original card mount has been left attached to the pin. Most type-material has been found in that collection bearing the accession label 'Cameron 1896-76', and in many instances the locality has been written on this label. Cameron's original specific labels are sometimes attached to the specimens. Some of the rectangular cards on which Cameron mounted his material have a number in the bottom left-hand corner. In a few cases this number has been crossed out and another number has been written in the right-hand corner. The number in the left-hand corner can usually be correlated with the figure number on the plate in Cameron (1890); occasionally this number seems to be the paragraph number of the species description in Cameron's monograph (1890). Only when the description, the locality and other data such as Cameron's original determination labels are present and agree with that published, has credence been given to this number. Cameron did not indicate which specimen of a series was to be regarded as the type. Unfortunately, prior to my examination of the Cameron material, the specimens had been moved in the collection from species to species and had not been given labels to indicate their original placements. There is usually no way of telling from Cameron's descriptions how many specimens he had before him when describing a new species; only very rarely did he state the number of specimens upon which he based a description. Where only one type-specimen has been found and there is no evidence that more than one specimen ever existed, I have accepted and labelled that specimen as the holotype, provided that it agrees with the original description and bears the same data as that published. Cameron was not always the collector of the specimens he described and in those cases where another collector is cited in the descriptions this is indicated in the type-data. All nominal species are arranged alphabetically under the genus in which they were described and within their respective subfamilies, together with references to the original description and other relevant papers in which they have been referred to or discussed, in the following sequence.

Name; author, date and page reference of the original publication; status and sex of primary type where known; present lectotype designation (if necessary); locality of primary type; type-depository.

Number and sex of paralectotypes if such exist, with data and depository information as for primary types.

Statement on the labelling of the type-material and its condition if damaged.

A statement (headed '*Identity*.') on the generic placement and taxonomic validity of the name, accompanied when known by similar data to that above for the names of senior and junior synonyms.

Notes on other aspects of the information supplied are given below.

Lost types. In those cases where the type-material is lost and there is no evidence on the number of original specimens or their sex, the statement 'Type(s) (? sex)' is used to show this lack of information.

Locality. Cameron did not always write the locality on his labels. In a number of instances one, two or three letters only were used to indicate the locality; I have given these localities in full. I have also added 'GREAT BRITAIN' and the county, although this information was not published in the original descriptions.

Collectors. Unless specifically stated to the contrary Cameron was the collector. In those cases where another collector was named and the material has not been found, it is presumed to have been returned to the collector and has had to be regarded as lost.

Type-depositories. These are given for the primary types of the synonyms of Cameron's names and for Cameron's nominal species. The following abbreviations are used to indicate these depositories.

BMNH	British Museum (Natural History), London.
IPK	Institut für Pflanzenschutzforschung Kleinmachnow, Eberswalde.
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin.
NM	Naturhistorisches Museum, Vienna.
NR	Naturhistoriska Riksmuseum, Stockholm.
UM	University Museum, Oxford.
UZI	Universitetets Zoologiska Institution, Lund.
ZSBS	Zoologische Sammlung des Bayerischen Staates, Munich.

Taxonomic arrangement. The family and subfamily arrangement is as given by Eady & Quinlan (1963 : 7). The number of segments in the antennal club has been important in the identification of many of the species. It is not clear what Cameron meant by the term 'club'; I have regarded as club segments those antennal segments that bear rhinaria, as defined by Richards (1956).

Kleidotoma Westwood (1833 : 494). Cameron first used the name *Kleditoma* (1888a : 165) when describing the species *nigripes*. In subsequent papers, including his monograph (1890 : 216) in which he describes and keys species in the genus *Kleidotoma* Westwood, he consistently spells the generic name as *Kleditoma* and refers to *Kleditoma* Westwood (1833 : 494). In interpreting Cameron's spelling of *Kleidotoma* it cannot be demonstrated that he intended to correct the original name and, therefore, the name *Kleditoma* is an 'incorrect subsequent spelling' as defined in Article 33(b) of the *International Code of Zoological Nomenclature*.

Neotypes. The neotypes here designated accord with the provisions of Article 75(a) of the current *International Code of Zoological Nomenclature*, and this paper

is considered to be revisionary work in the terms of the *Code* and of the proposed amendments to Article 75(a) (*Bull. zool. Nom.* **29**(2) : 90, 1972).

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I would like to thank those colleagues in other museums and institutions who have provided me with types on loan and information on the Cameron collection. For such assistance I warmly thank the following: Dr R. Danielson (Universitetets Zoologiska Institution, Lund); Dr Max Fischer (Naturhistorisches Museum, Vienna); Dr M. W. R. de V. Graham (University Museum, Oxford), Dr W. Hellén (Zoological Museum of the University, Helsinki); Dr E. Königsmann (Museum für Naturkunde der Humboldt-Universität, Berlin); Dr F. Köhlhorn (Zoologische Sammlung des Bayerischen Staates, Munich), Dr G. Morge (Institut für Pflanzenschutzforschung Kleinmachnow, Eberswalde).

CYNIPIDAE

CHARIPINAE

Allotria ancylocera Cameron, 1886 : 85. Holotype ♂, GREAT BRITAIN: Scotland, West Lothian, Carruber Glen, 14. viii (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Carruber Glen'. On the underside of the label is the name 'ancylocera'. A further rectangular card mount has the name 'Carruber' and 'ancylocera' together with the date '14/8'. A separate label with the word 'Holotype' printed in the centre has been added together with a determination label 'HOLOTYPE of *Allotria ancylocera* Cam. det. J. Quinlan. 1973'.

Identity. **Syn. n.** of *Alloxysta victrix* (Westwood, 1833 : 495), holotype ♀, GREAT BRITAIN (UM, Oxford) [examined]. Hellén (1963 : 16) first established the combination *Alloxysta victrix* (Westwood) and it is here confirmed.

Allotria basimacula Cameron, 1886 : 87. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Stirlingshire, Mugdock (BMNH, ex coll. Cameron), here designated.

Paralectotype. 1 ♂, same data as the lectotype (BMNH).

The lectotype and the paralectotype have the BMNH accession label 'Cameron 96-76 Mugdock'. Both specimens have the original rectangular card mount with the name 'Mugdock' and an unintelligible date written on the underside. The card mount attached to the lectotype has the name 'basimacula' written on it. The paralectotype has a separate label in Cameron's handwriting 'basimacula'. A further purple-edged circular label with the printed word 'Lectotype' in the centre has been added to the lectotype. A similar blue-edged paralectotype label has been added to the paralectotype. Both specimens have a determination label 'LECTOTYPE' and 'PARALECTOTYPE' respectively 'of *Allotria basimacula* Cam. det. J. Quinlan. 1973'.

Identity. Valid species of *Alloxysta* Förster. Dalla Torre & Kieffer (1910 : 258) first established the combination of *Alloxysta basimacula* (Cameron) and it is herein confirmed.

Allotria caledonica Cameron, 1886 : 88. Holotype ♀, GREAT BRITAIN: Scotland, Stirlingshire, Mugdock, 27. vii (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Mugdock'. On the underside of the label is the name 'caledonica'. The rectangular card on which the holotype is mounted has the number '2' in the left-hand corner; this is the figure number on the plate in Cameron (1890). On the underside of the card mount is the name 'caledonica Cam.'

and the date '27/7' and the letters 'Mugd'. A further label 'caledonica' in Cameron's handwriting is attached to the holotype. A red-edged circular label with the word 'Holotype' printed in the centre has been added together with a determination label 'HOLOTYPE of *Allotria caledonica* Cam. det. J. Quinlan 1973'. The holotype has only 8 segments of the right antenna and 10 of the left antenna remaining; all the tarsi are damaged and the wings are damaged by the glue used for mounting the specimen.

Identity. Valid species of *Alloxysta* Förster, combination first established by Dalla Torre & Kieffer (1910 : 256) as *Alloxysta caledonica* (Cameron) and herein confirmed.

Allotria collina Cameron, 1889 : 57. Type(s) ♀, GREAT BRITAIN: Scotland, Stirlingshire, Mugdock (Cameron Coll.) (lost).

Identity. Unknown, the name remains a *nomen dubium*. Dalla Torre & Kieffer (1910 : 280) placed *collina* in *Charips* Marshall (1870 : 181), attributing the latter name to 'Haliday in Marshall' (loc. cit.) as does Ionescu (1969 : 237). It seems most probable from the species description that *collina* is assignable to *Alloxysta* Förster but in the absence of type-material the name must remain a *nomen dubium*.

Allotria crassa Cameron, 1889 : 59. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Sutherland, Bonar Bridge (BMNH, ex coll. Cameron), here designated.

Paralectotypes. GREAT BRITAIN: 1 ♀, Scotland, Argyll, Cladich; 1 ♀, Scotland, Dumfries-shire, Dumfries (correctly associated); 1 ♀ (misassociated), Scotland, Dumfries-shire, Dumfries.

The lectotype and the paralectotypes have the BMNH accession label 'Cameron 96-76' together with their respective localities as listed above. The lectotype has the original rectangular card mount on the underside of which is the locality 'Bonar'. A further handwritten label 'crassa Cam' is attached, on the underside of which is the name 'scipes Thom'. This is deduced as being originally 'fuscipes' Thom before being used to write the name 'crassa Cam' on the other side. A purple-edged circular label with the printed word 'Lectotype' has been added together with a determination label 'LECTOTYPE of *Allotria crassa* Cam. det. J. Quinlan. 1973'. The two correctly associated paralectotypes both have blue-edged circular paralectotype labels and determination labels '*Allotria crassa* Cam. det. J. Quinlan 1973'. The misassociated paralectotype has a blue-edged circular paralectotype label and a label in Cameron's handwriting '*Allotria fuscipes*'. A further label 'PARALECTOTYPE of *Allotria crassa* Cam. wrongly associated det. J. Quinlan 1973' is attached. This wrongly associated paralectotype is referable to the genus *Phaenoglyphis* Förster.

Identity. Valid species of *Alloxysta* Förster, first established by Dalla Torre & Kieffer (1910 : 261) and herein confirmed.

Allotria dolichocera Cameron, 1889 : 56. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Dumfries-shire, Dumfries (BMNH, ex coll. Cameron).

Paralectotypes. GREAT BRITAIN: 1 ♀ (misassociated), Scotland, Lanarkshire, Cadder Wilderness (BMNH); 1 ♀ (misassociated), England, London, Peckham (*T. R. Billups*) (BMNH).

The lectotype herein designated and the paralectotypes have the BMNH accession label 'Cameron 96-76' together with their respective localities as listed above. The lectotype has a label in Cameron's handwriting 'dolichocera', on the other side of this label is the name 'brevis Thoms' but the top of this name has been cut off. A further rectangular card on which the lectotype was originally mounted has on the underside the locality 'Dumfries' and the word 'brevis'. The two misassociated paralectotypes clearly belong in the genus *Alloxysta* Förster and do not agree with Cameron's description of *dolichocera* on the relative lengths of the antennal segments. The paralectotype collected by Billups has both antennae damaged but the critical segments are still present. A purple-edged circular label with the word 'Lectotype' has been added, together with a determination label 'LECTOTYPE of *Allotria dolichocera* Cam. det. J. Quinlan 1973'.

Identity. Valid species of *Phaenoglyphis* Förster, new combination *Phaenoglyphis dolichocera* (Cameron) **comb. n.** here established.

Allotria maculicollis Cameron, 1886 : 87. Type(s) ♂, GREAT BRITAIN: Scotland, Kirkcudbrightshire, New Galloway (Cameron Coll.) (lost).

Identity. Unknown, the name remains a *nomen dubium*. The identity cannot be deduced from Cameron's (1890 : 252) key placement, in which *Allotria macrophadna* is compared with *maculicollis*. The name was applied almost certainly to an *Alloxysta* species.

Allotria megaptera Cameron, 1889 : 54. Holotype ♂, GREAT BRITAIN: Scotland, Lanarkshire, Cadder Wilderness (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Cadder Wilderness'. On the underside of this label is the name 'megaptera'. Two further labels in Cameron's handwriting are attached to the holotype pin: they read 'Allotria' and 'megaptera Cam'. On the original rectangular card is the number '7'; this is the figure number on the plate in Cameron (1890). A further red-edged circular label with the word 'Holotype' printed in the centre has been attached together with a determination label 'HOLOTYPE of *Allotria megaptera* Cam. det. J. Quinlan 1973'. The left fore wing and both hind wings are missing.

Identity. Valid species of *Alloxysta* Förster, new combination *Alloxysta megaptera* (Cameron) **comb. n.** here established. Cameron first listed *megaptera* in a key to the British *Allotria* without designating it 'sp. nov.' as was usually his custom. The description in the couplet of the key to *Allotria* satisfies the provisions of Article 11 of the *International Code of Zoological Nomenclature*. *Allotria melanogaster* Hartig (1840 : 200), misidentified by Cameron (1886 : 86), was later described as *Allotria megaptera* Cameron (1889 : 54).

Allotria mullensis Cameron, 1883 : 366. Holotype ♀, GREAT BRITAIN: Scotland, Argyll, Mull (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Mull'. On the underside of this label is the name 'mullensis'. The original card mount has the number '1' in the left-hand corner; this is the figure number on the plate in Cameron (1890). A further label 'mullensis Cam'. in Cameron's handwriting is attached. A red-edged circular label with the word 'Holotype' printed in the centre has been added together with a determination label 'HOLOTYPE of *Allotria mullensis* Cam. det. J. Quinlan 1973.'

Identity. Valid species of *Alloxysta* Förster, new combination *Alloxysta mullensis* (Cameron) **comb. n.** here established.

Allotria perplexa Cameron, 1889 : 58. Type(s) ♀, GREAT BRITAIN: Scotland, Sutherland; Inverness-shire, Kingussie; Lanarkshire, Clydesdale; Kirkcudbrightshire, New Galloway; Dumfries-shire, Dumfries (Cameron Coll.) (lost).

Identity. Unknown, the name remains a *nomen dubium*. Hellén (1963 : 12) placed *perplexa* in the genus *Alloxysta* Förster, but without seeing type-material. In the absence of type-material the name must remain a *nomen dubium*.

Allotria piceomaculata Cameron, 1883 : 367. Holotype ♀, GREAT BRITAIN: Scotland, Dumfries-shire, Dumfries, vi (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Dumfries', on the underside of this label is the name 'piceomaculata'. The rectangular card on which the holotype was originally mounted has the number '3'; this is the figure number on the plate in Cameron (1890). On the underside of the card mount is the locality 'Dumfries' and the name 'piceomaculata'. The rectangular card mount on which the holotype is mounted also has the number '3' in the left-hand corner. A further label in Cameron's handwriting 'piceomaculata Cameron' is attached to the holotype. A red-edged circular label with the word 'Holotype' printed in the centre has been added together with a determination label 'HOLOTYPE of *Allotria piceomaculata* Cam. det. J. Quinlan 1973'. The holotype has only one segment remaining of the left antenna.

Identity. Valid species of *Alloxysta* Förster, combination first established by Cameron (1886 : 88) and here confirmed.

Allotria pleuralis Cameron, 1879 : 113. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Lanarkshire (BMNH, ex coll. Cameron), here designated.

Paralectotypes. GREAT BRITAIN: 2 ♀, Scotland, Lanarkshire (BMNH, ex coll. Cameron). The lectotype has the BMNH accession label 'Cameron 96-76'. Both the rectangular

card on which it is mounted and the original card mount have the number '8' in the bottom left-hand corner. This number is the reference to the figure number on the plate in Cameron (1890). A further purple-edged circular lectotype label has been added together with a determination label 'LECTOTYPE of *Allotria pleuralis* Cam. det. J. Quinlan 1973'. The left antenna has the apical segment missing. The two paralectotypes are labelled 'Cameron 96-76' and carry the label 'pleuralis'. Two further specimens have not been located. (Five specimens were referred to in the original description, three from Clyde near Newton and two from Possil Marsh, all taken in July. One paralectotype has the locality Possil Marsh.)

Identity. **Syn. n.** of *Xystus testacea* Hartig, 1841 : 352, holotype ♀, AUSTRIA (ZSBS, Munich) and new combination *Alloxysta testacea* (Hartig) **comb. n.** here established.

Allotria ruficeps Cameron, 1883 : 365. Type(s) ♀, GREAT BRITAIN: Scotland, Kirkcudbrightshire, New Galloway, vi (Cameron Coll.) (lost).

Identity. Unknown, the name remains a *nomen dubium*. Dalla Torre & Kieffer (1910 : 283) proposed a replacement name *Charips (Charips) cameroni* for *Allotria ruficeps* Cameron, which was preoccupied by *Allotria ruficeps* (Zetterstedt, 1883 : 410).

Allotria ruficollis Cameron, 1883 : 385. Holotype ♀, GREAT BRITAIN: Scotland, Argyll, Mull, vi (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Mull'. The original rectangular card mount has on the underside the words 'Mull ruficollis'. A further hand-written label in Cameron's handwriting 'ruficollis Cam.' is attached. A red-edged circular label with the word 'Holotype' printed in the centre has been added together with a determination label 'HOLOTYPE of *Allotria ruficollis* Cam. det. J. Quinlan 1973'.

Identity. **Syn. n.** of *Xystus erythrothorax* Hartig, 1840 : 200, holotype ♂, GERMANY (ZSBS, Munich). Dalla Torre & Kieffer (1910 : 257) first established the combination *Alloxysta erythrothorax* (Hartig) and it is here confirmed.

Allotria salicis Cameron, 1883 : 367. Type(s)? ♀, GREAT BRITAIN: Scotland, Lanarkshire, Clydesdale, Kilpatrick Hills (*Rev. T. A. Marshall*) (lost).

Identity. This nominal species clearly belongs in the genus *Phaenoglyphis* Förster. Cameron (1890 : 237) first established *salicis* as being in *Phaenoglyphis* but in the absence of the type(s) or reliably determined material the specific name remains a *nomen dubium*.

Phaenoglyphis forticornis Cameron, 1888b : 210. Type(s) ♀, GREAT BRITAIN: England, Barnstaple, Lastingham (*Rev. T. A. Marshall*) (lost).

Identity. Unknown, the name remains a *nomen dubium*. Dalla Torre & Kieffer (1910 : 294) and Ionescu (1969 : 274) placed *forticornis* in *Phaenoglyphis* Förster but without seeing type-material; the name must remain a *nomen dubium*.

CYNIPINAE

Aulax graminis Cameron, 1875 : 322. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Lanarkshire, Glasgow, near Partick (BMNH, ex coll. Cameron), here designated.

Paralectotypes. 3 ♀, same data as the lectotype (BMNH).

The lectotype and the paralectotypes have the BMNH accession label 'Cameron 96-76'. The lectotype has a label in Cameron's handwriting 'graminis Cam'. A further purple-edged circular label with the printed word 'Lectotype' has been added, together with a further determination label 'LECTOTYPE of *Aulax graminis* Cam. det. J. Quinlan 1973'. A blue-edged circular label with the printed word 'Paralectotype' has been added to each paralectotype.

Identity. Junior synonym of *Aulacidea hieracii* (Bouché, 1834 : 164), holotype ♀, GERMANY (DEI, Eberswalde). The synonymy of *graminis* with *hieracii* was first established by Cameron (1893 : 50) and recently confirmed by Eady & Quinlan (1963 : 20), who inadvertently marked the synonymy as new.

Diasiphus (?) aphidivorus Cameron, 1889 : 67. Holotype ♂, GREAT BRITAIN: England, ?Barnstaple (*Rev. T. A. Marshall*) (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76'. The original rectangular card mount has on the underside the words 'Aphis of Nettle N'. On the upperside of the card mount can be seen the lighter areas where the holotype and the aphis referred to in Cameron's description had been mounted. The number '7', badly faded, can be seen that refers to the plate figure reference in Cameron (1893). A further label 'aphidivorus' in Cameron's handwriting is attached to the pin. A red-edged circular label with the printed word 'Holotype' in the centre has been added together with the determination label 'HOLOTYPE of *Diastrophus aphidivorus* Cam. det. J. Quinlan 1973'. The holotype has the left hind tibia and tarsus missing.

The biological information in Marshall's handwriting 'Aphis of Nettle N' is suspect. The 'N' on the label gives rise to doubt on the actual type-locality published by Cameron as 'Barnstaple'. Morley (1915 : 23), who lists the Rev. T. A Marshall's localities, gives the letter 'N' as Marshall's abbreviation for Nunton, near Salisbury (Wiltshire).

Identity. **Syn. n.** of *Diastrophus rubi* (Bouché, 1834 : 163), holotype ♀, GERMANY (MNHU, Berlin) [examined].

Dalla Torre & Kieffer (1910 : 49) listed *aphidivorus* as a species of *Trischiza* Förster (Figitinae).

EUCOILIDAE

Eucoila fortinervis Cameron, 1889 : 66. Holotype ♂, GREAT BRITAIN: England, Gloucester (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Gloster'. The original rectangular card on which it was mounted has the number '9' on the upper surface and the locality 'Gloster' on the underside. The number '9' is the reference to the figure number on the plate in Cameron (1890). The holotype has the label 'fortinervis Cam' in Cameron's handwriting attached to it. Although Cameron did not describe the female of *fortinervis*, pl. 9, fig. 9 in Cameron (1890) of a female suggests that the figure was transposed with that of another species, most probably *proxima*. A red-edged circular label with the word 'Holotype' printed in the centre has been attached, together with a determination label 'HOLOTYPE of *Eucoila fortinervis* Cam. det. J. Quinlan 1973.' The holotype has segments 14-15 of the right-hand antenna missing.

Identity. Valid species of *Trybliographa* Förster, new combination *Trybliographa fortinervis* (Cameron) **comb. n.** here established.

Eucoila gracilicornis Cameron, 1888a : 168. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Lanarkshire, Banks of Clyde nr Cambuslang.

Paralectotypes. 2 ♂, same data as the lectotype (BMNH, ex coll. Cameron).

The lectotype herein designated has the BMNH accession label 'Cameron 96-76 S. BK. Clyde'. A rectangular label with 'gracilicornis CBL' and the name 'similis' crossed out is attached. On the underside of this label is the number '4'; this number seems to be the paragraph number in Cameron (1890 : 199), in which the species is described. Another label added at a later stage by G. J. Kerrich has the abbreviation 'Pseudeuc' on it. A circular purple-edged label with the printed word 'Lectotype' has been added together with a determination label 'LECTOTYPE of *Eucoila gracilicornis* Cam. det. J. Quinlan 1973'. Both paralectotypes have had blue-edged circular paralectotype labels added to them, together with determination labels.

Identity. This valid species was first placed in *Trybliographa* Förster by Hellén (1960 : 12). The placing of *gracilicornis* in *Trybliographa* by Hellén is herein confirmed.

Eucoila proxima Cameron, 1889 : 67. LECTOTYPE ♀, GREAT BRITAIN: England, Essex, Benfleet (BMNH, ex coll. Cameron), here designated.

Paralectotypes. 2 ♀, same data as the lectotype except that Benfleet is omitted (BMNH, ex coll. Cameron).

The lectotype has the BMNH accession label 'Cameron 96-76 Benfleet'. A further

purple-edged circular label with the printed word 'Lectotype' in the centre has been added together with a determination label 'LECTOTYPE of *Eucoila proxima* Cam. det. J. Quinlan 1973'. One paralectotype has the additional label 'proxima Cam' in Cameron's handwriting and the number '16/83', together with the number '14' in one corner and the number '8' in the other. The number '8' is the number of the figure on the plate in Cameron (1890). This plate and figure shows a male; Cameron did not describe the male of *proxima* and this suggests that the figure was transposed with that of *fortinervis* Cameron. The other paralectotype has a label 'proxima Cam' in Cameron's handwriting and the number '15' on the original card mount.

Identity. **Syn. n.** of *Trybliographa glottiana* (Cameron 1883 : 368), holotype ♀, GREAT BRITAIN (BMNH, ex coll. Cameron) [examined, see p. 14].

Eucoila scotica Cameron, 1889 : 65. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Dumfries-shire, Dumfries (BMNH, ex coll. Cameron), here designated.

Paralectotypes. GREAT BRITAIN: 1 ♀, Scotland, Stirlingshire, Mugdock (BMNH, ex coll. Cameron); 1 ♂, 1 ♀, Scotland, Dumfries-shire, Dumfries (BMNH, ex coll. Cameron); 1 ♀, Scotland, Dumfries-shire, Dumfries (BMNH, ex coll. Cameron); 1 ♀, Scotland, Kirkcudbrightshire, Colvend (BMNH, ex coll. Cameron); 1 ♀, Scotland, no locality; 1 ♂, Scotland, West Lothian, Carruber Glen (BMNH, ex coll. Cameron); 2 ♀, Scotland, Ayrshire, Dalry (BMNH, ex coll. Cameron).

The lectotype has the BMNH accession label 'Cameron 96-76. Dumfries', together with another rectangular label with the locality and name 'Dumfries scotica'. A further label in Cameron's handwriting is attached and reads 'scotica Cam'. On the reverse side of this label is the abbreviation 'clia (new sp. ?) ♀'. A purple-edged circular label with the printed word 'Lectotype' has been added, together with a determination label 'LECTOTYPE of *Eucoila scotica* Cam. det. J. Quinlan 1973'. The paralectotypes all have the BMNH accession label 'Cameron 96-76' together with their respective locality names and the determination label 'scotica'. The paralectotype from Colvend has the name labels 'ciliaris' and 'scotica'; on the underside of this label is the number '3', which is the figure number on the plate in Cameron (1890).

Identity. Valid species of *Trybliographa* Förster, new combination *Trybliographa scotica* (Cameron) **comb. n.** here established.

Kleidotoma affinis Cameron, 1889 : 64. Holotype ♀, GREAT BRITAIN: Scotland, Sutherland, Bonar Bridge (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Bonar Bridge'. A further label in Cameron's handwriting is attached and reads 'affinis Bonar'. A circular red-edged label with the printed word 'Holotype' has been added, together with a determination label 'HOLOTYPE of *Kleidotoma affinis* Cam. det. J. Quinlan. 1973'.

Identity. This valid nominal species is clearly assignable to *Kleidotoma* subgen. *Tetraopta* Förster (1869 : 342), senior synonym of *Tetratoma* Cameron (1890 : 223).

Kleidotoma caledonica Cameron, 1888a : 167. Type(s) ♀, GREAT BRITAIN: Scotland, Argyll, Claddich, Loch Awe (Cameron) (lost).

NEOTYPE ♀, GREAT BRITAIN: England, Buckinghamshire, Greenlands, 31.vii.1936, 'reared from nest of Heron, No. 2.' (BMNH), here designated. I have been unable to locate the original female type(s). The neotype here designated has, in addition to the data above, a red-edged circular label with the printed word 'Neotype' in the centre, an identification label '*Kleidotoma caledonica* Cam. J. F. P. 1947.', and the label 'NEOTYPE of *Kleidotoma caledonica* Cam. det. J. Quinlan 1973'.

Identity. This valid species is clearly assignable to *Kleidotoma* subgen. *Kleidotoma* Westwood. Dalla Torre & Kieffer (1910 : 210), Hellén (1960 : 24) and Ionescu (1969 : 139) have referred to this species and have used the characters that Cameron used in his original description for identifying it. The BMNH collection contains 2 ♀, identified and labelled as *caledonica* by J. F. Perkins, which agree with the original description; one of these has been designated neotype. Cameron's description isolates *caledonica* from other related species on the antennal club being shorter than the flagellum, the scutellum not projecting at the

apex, the legs being black, the radial cell elongate and the joints of the antennal club being attenuate. Cameron did not know the male of the species. Dalla Torre & Kieffer (1910: 211) and Ionescu (1969: 139) refer in error to both male and female in Cameron's works (1888a: 166; 1890: 224).

Kleiditoma crassiclava Cameron, 1888a: 166. Holotype ♀, GREAT BRITAIN: Scotland, Sutherland, Bonar Bridge (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'P. Cameron Coll. B.M. 1914-110'. The original rectangular card mount has the name 'crassiclava' on the underside; the same card mount has the locality 'Bonar' written across the specific name. Both the species name and the locality are written in Cameron's handwriting. The holotype has been remounted on a card point. A red-edged circular label with the printed word 'Holotype' in the centre has been attached, together with a determination label 'HOLOTYPE of *Kleiditoma crassiclava* Cam. det. J. Quinlan. 1973.'

Identity. This valid species is assignable to the genus *Rhynchacis* Förster. The combination with *Rhynchacis* Förster was first established by Cameron (1890: 217).

Kleiditoma elegans Cameron, 1889: 60. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Stirlingshire, Mugdock Wood, nr Glasgow (BMNH, ex coll. Cameron), here designated.

Paralectotype. GREAT BRITAIN: 1 ♀ (misassociated), Scotland, Lanarkshire, Clober Glen, nr Glasgow (BMNH, ex coll. Cameron).

The lectotype has the BMNH accession label '96-76 Mugdock Wood'. The specific name 'elegans Cam.' in Cameron's handwriting is attached to the lectotype. The original card mount has the number '9' in the bottom right-hand corner; this is the figure number to the plate in Cameron (1890). The misassociated paralectotype has a specific label 'elegans?' in Cameron's handwriting; although similar to *elegans*, it has the antennal segments differently shaped and of different comparative lengths. It is *Kleiditoma pentatoma* Thomson.

Identity. This valid species is assignable to *Kleiditoma* subgen. *Pentakleidota* Weld and is the type-species of this subgenus.

Kleiditoma filicornis Cameron, 1889: 62. Type(s) ♀, GREAT BRITAIN: England, Devon, Bishopsteignton (*Rev. T. A. Marshall*) (lost).

NEOTYPE ♀, GREAT BRITAIN: England, Norfolk, Holkham, 17.vii.1968 (*M. Crisp*) (BMNH), here designated.

I have been unable to locate the original female type(s). Various authors, Dalla Torre & Kieffer (1910), Hellén (1960) and Ionescu (1969) have all referred to this species in published works and have used the characters that Cameron used in his original description for identifying this species. The neotype here designated is one of 8 females with identical data; a red-edged circular label with the printed word 'Neotype' in the centre has been attached, together with a further label 'NEOTYPE of *Kleiditoma filicornis* Cam. det. J. Quinlan 1973.'

Identity. This valid species is assignable to *Kleiditoma* subgen. *Kleiditoma* Westwood and is separated from related species on the long thin antennae, the less abrupt club and the long narrow radius of the forewing.

Dalla Torre & Kieffer (1910) wrongly cite Cameron (1890) as describing the male.

Kleiditoma gracilicornis Cameron, 1889: 63. Type(s) ♀, GREAT BRITAIN: England, Wiltshire, Nunton (publ. as Munton) (*Rev. T. A. Marshall*) (lost).

Identity. This nominal species clearly belongs in the genus *Kleiditoma* subgen. *Tetrahoptra* Förster, but in the absence of the type(s) or reliably determined material the specific name remains a *nomen dubium*.

The male of this species was not described.

Kleiditoma longicornis Cameron, 1899: 62. Type(s) ♀, GREAT BRITAIN: England, Devon, Barnstaple (*Rev. T. A. Marshall*) (lost).

Identity. This nominal species belongs in the genus *Kleiditoma* subgen. *Kleiditoma* Westwood, but in the absence of the type(s) or reliably determined material the specific name remains a *nomen dubium*.

Kleiditoma longipennis Cameron, 1889 : 59. Holotype ♀, GREAT BRITAIN: Scotland, Lanarkshire, Clober Moor, nr Glasgow (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Clober Moor', on the reverse side of which is the name 'longipennis'. A further label in Cameron's handwriting 'longipennis Cam.' and a smaller label with the name 'longipennis' is attached. The original card on which the holotype was mounted has the data 'Clober Moor'. The rectangular card on which the holotype is mounted has the number '8' in the bottom left-hand corner with a line crossing the number out; in the right-hand corner of the card mount is the number '9'. The latter number is the figure number on the plate in Cameron (1890).

Identity. This valid species belongs in the genus *Kleidotoma* subgen. *Pentakleidota* Weld. The male of this species was not described.

Kleiditoma marshalli Cameron, 1889 : 61. Type(s) ♀ ♂, GREAT BRITAIN: England, Devon, Barnstaple (*Rev. T. A. Marshall*) (lost).

Identity. This nominal species clearly belongs in the genus *Kleidotoma* subgen. *Kleidotoma* Westwood, but in the absence of the type(s) or reliably determined material the specific name remains a *nomen dubium*.

Kleiditoma melanopoda Cameron, 1888a : 167. Holotype ♀, GREAT BRITAIN: England, London District (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76'; no locality data are attached. The holotype is mounted on a rectangular card in the bottom left-hand corner of which is the number '10'; this number is the figure number on the plate in Cameron (1890). A label 'melanopoda' in Cameron's handwriting is attached. A red-edged circular label with the word 'Holotype' printed in the centre has been attached, together with a determination label 'HOLOTYPE of *Kleidotoma melanopoda* Cam. det. J. Quinlan. 1973.'. (Although not stated in the original description, Cameron (1890 : 231) indicates that the Rev. T. A. Marshall was the collector of this specimen from the same locality 'London District'.)

Identity. This valid species belongs in the genus *Kleidotoma* subgen. *Arhoptra* Kieffer. The male of this species was not described.

Kleiditoma nigripes Cameron, 1888a : 165. Type(s) ♀, GREAT BRITAIN: England, London, Dulwich (*T. R. Billups*) (lost).

NEOTYPE ♀, GREAT BRITAIN: England, Hertfordshire, Harpenden, Rothamsted, 1951 (*B. R. Lawrence*), B.M. 1951-450 (BMNH), here designated.

No Cameron material of this species stands in the BMNH collection under this name and all attempts to trace the type(s) in collections that could have contained T. R. Billups material have been fruitless. The neotype here designated is one of four females with the above data in the BMNH collection determined as '*Rhynchacis nigripes* (Cam)' by G. J. Kerrich, 1951. It has a red-edged circular label with the word 'Neotype' printed in the centre, together with a determination label 'NEOTYPE of *Kleidotoma nigripes* Cam. det. J. Quinlan. 1973.'.

Identity. Valid nominal species of *Rhynchacis* Förster, combination *Rhynchacis nigripes* (Cameron) first established by Cameron (1890 : 218) and here confirmed.

Kleiditoma picipes Cameron, 1886 : 92. Holotype ♀, GREAT BRITAIN: Scotland (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76'. No data label for the locality is attached. A label in Cameron's handwriting is attached and reads 'picipes'. The holotype is mounted on a rectangular card; in the bottom left-hand corner is the number '10', which is the figure number on the plate in Cameron (1890). The holotype bears a red-edged circular label with the printed word 'Holotype' in the centre, together with a determination label 'HOLOTYPE of *Kleidotoma picipes* Cam. det. J. Quinlan. 1973.'.

Cameron did not give a locality in his original description, although the paper was on the fauna of Scotland with particular reference to Clydesdale. In a later reference to the species, Cameron (1890 : 226) gave Clydesdale as the locality for the species.

Identity. This valid species of *Kleidotoma* Westwood is newly assigned to the subgen.

Kleidotomidea Rohwer & Fagan (1917 : 369). In placing *picipes* I have by examination counted as club segments of the antennae those segments having rhinaria.

The male of *picipes* was not described by Cameron.

Kleditoma striata Cameron, 1886 : 91. Holotype ♂, GREAT BRITAIN: Scotland, Lanarkshire, Lanark, nr Newton on the Clyde (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76. S. Bk. Clyde'. Two determination labels in Cameron's handwriting are attached, one has the name 'striata' and the other has the name 'Kleditoma striata Cam 3'. The number '3' is repeated again on the rectangular card mount and is the figure number on the plate in Cameron (1890). The holotype bears a red-edged circular label with the printed word 'Holotype' in the centre. A further determination label 'HOLOTYPE of *Kleidotoma striata* Cam. det. J. Quinlan. 1973.' has been attached.

Identity. This valid species belongs in *Kleidotoma* subgen. *Pentakleidota* Weld.

Cameron did not describe the male of this species although one male from his collection labelled as *striata* is in the BMNH collection.

Kleditoma striaticollis Cameron, 1888a : 167. Holotype ♀, GREAT BRITAIN: Scotland, Kirkcudbrightshire, New Galloway (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Galloway' together with a further label with the locality 'Galloway' and the name 'striaticollis' in Cameron's handwriting. The holotype is mounted on a rectangular card; in the bottom left-hand corner is the number '8'. This number is the paragraph number given to the species in Cameron (1890 : 222). No figure of the species was given by Cameron. A red-edged circular label with the printed word 'Holotype' in the centre has been attached to the holotype together with a determination label 'HOLOTYPE of *Kleidotoma striaticollis* Cam. det. J. Quinlan. 1973.'.

Identity. This valid species belongs in the genus *Kleidotoma* subgen. *Kleidotoma* Westwood.

The male of *striaticollis* was not described by Cameron.

Kleditoma truncata Cameron, 1889 : 60. Holotype ♀, GREAT BRITAIN: Scotland, Renfrewshire, Bishopton, 31. vii (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Bishopton'. A further label with the locality 'Bishopton 31/7' is attached to the holotype together with a label 'truncata Cam.' in Cameron's handwriting and another label with 'truncata 2' is also attached to the holotype. The number '2' on the second name label is the number of the figure on the plate in Cameron (1890). A red-edged circular label with the printed word 'Holotype' in the centre has been added, together with a determination label 'HOLOTYPE of *Kleidotoma truncata* Cam. det. J. Quinlan. 1973.'.

Identity. This valid species of *Kleidotoma* Westwood is newly assigned to the subgen. *Pentakleidota* Weld (1952 : 225).

Psichacra dalei Cameron 1879 : 115. Holotype ♀, GREAT BRITAIN: England, Dorset, Wooton (J. C. Dale) (lost).

NEOTYPE ♀, GREAT BRITAIN: England, Monmouth, Monks Wood, 5.x.1878 (BMNH), here designated. I have been unable to locate the original female holotype of this species. Cameron (1890 : 198) gives an additional locality to that in his first description: Worcester (Fletcher). The neotype here designated, in addition to the data above, has the labels 'Cameron 96-76 Monks Wd.' and a handwritten label 'rufula Forst'. The neotype is one of three specimens with identical data in the BMNH and is distinguished from them by a red-edged circular label with the printed word 'Neotype' in the centre. A further label 'NEOTYPE of *Psichacra dalei* Cam. det. J. Quinlan 1973.' has been added.

Identity. Junior synonym of *Psichacra rufula* (Förster, 1855 : 257), synonymy first established by Cameron (1890 : 197) and here confirmed.

Psichacra glottiana Cameron, 1883 : 368. Holotype ♀, GREAT BRITAIN: Scotland, Lanarkshire, Cambuslang (publ. as Cambusland), along the banks of the Clyde, vii (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 South Bank of the Clyde'. A further rectangular card on which the holotype was originally mounted has the number '7' in the right-hand corner; this is the number of the figure on the plate in Cameron (1890). On the underside of this label are the initials 'CBL' and the specific name 'glottiana' in Cameron's handwriting. A further label in Cameron's writing 'glottiana' is also attached to the holotype. An additional label is attached to indicate the name under which the holotype stood in the BMNH collection; it reads 'In BM. coll. under *Trybliographa mandibularis* (Zett)'. A red-edged circular label with the printed word 'Holotype' in the centre has been attached, together with a determination label 'HOLOTYPE of *Psichacra glottiana* Cam. det. J. Quinlan. 1973'.

Identity. Valid species of *Trybliographa* Förster, new combination *Trybliographa glottiana* (Cameron) **comb. n.** here established, and senior synonym of *proxima* Cameron, 1889 (see p. 10).

Psichacra marshalli Cameron, 1883 : 369. Type(s) ♂, GREAT BRITAIN: England, Devon, Barnstaple (*Rev. T. A. Marshall*) (lost).

NEOTYPE ♂, GREAT BRITAIN: England, Surrey, Boxhill (*C. G. Champion*) (BMNH, ex coll. Cameron), here designated.

I have been unable to locate the original male type(s). Dalla Torre & Kieffer (1910) and Hellén (1960) have referred to this species in published works and have used the characters that Cameron used in the original description for identifying it. The identity of *marshalli* is clear from the neotype here designated. It has a label 'Box Hill 67 74', a handwritten label 'Gronotoma marshalli', the BMNH accession label 'Cameron 96-76 Box Hill', and a red-edged label with the printed word 'Neotype' in the centre. A determination label 'NEOTYPE of *Psichacra marshalli* Cam. det. J. Quinlan 1973,' has also been attached to it. A further label attached to the neotype reads 'New Genus B of Weld 1952, G. J. Kerrich det. 1960'.

Identity. This valid species is not assignable to a recognized genus at present. It runs in the keys to genera of Weld (1952 : 108) to his genus 'B'. It is proposed to publish a description of this new genus in another publication.

Psichacra similis Cameron, 1883 : 368. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Lanarkshire, Cambuslang [publ. as Cambusland along the banks of the Clyde] (BMNH, ex coll. Cameron), here designated.

Paralectotype. 1 ♂, same data as the lectotype except that the BMNH accession number is 'Cameron 86-3 South Bank Clyde' and a label 'CBL'. A further label in Cameron's handwriting 'Eucoela mandibularis Zett' is attached.

Non-syntypic specimens. In the BMNH collection are five Cameron specimens that agree with the original description but they do not have the lectotype data: 1 ♂ without data; 1 ♂, Clober; 1 ♂, Gloucester; 1 ♀, labelled 'N'; and 1 ♀, Dalry. Cameron referred only to 'Cambusland' as the type-locality. All five specimens have been labelled 'These specimens have no type status'.

The lectotype, which has been remounted on a rectangular card, has the BMNH accession label 'Cameron 96-76'. The original card mount is attached to the pin; on the underside of this card mount are the specific names 'similis' and 'mandibularis' written in ink over the pencilled word 'Cambusland 7/9?'. On the upper surface of this card in the bottom left-hand corner is the number '5'; this is the figure number on the plate in Cameron (1890 : 220) to the species *Trybliographa mandibularis* (Zetterstedt). A circular purple-edged label with the printed word 'Lectotype' in the centre has been attached together with a determination label 'LECTOTYPE of *Psichacra similis* Cam. det. J. Quinlan. 1973'.

Identity. Junior synonym of *Trybliographa mandibularis* (Zetterstedt, 1838 : 410) (*Figites*), syntypes ♂ ♀, SWEDEN (NR, Stockholm) [examined]. The synonymy of *similis* with *mandibularis* was first established by Cameron (1890 : 200) and is here confirmed after direct comparison of the lectotype and syntypes.

Trybliographa crassicornis Cameron, 1889 : 64. Holotype ♀, GREAT BRITAIN: Scotland, Lanarkshire, Cambuslang on the Clyde (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 South Bk Clyde'; a further label in Cameron's handwriting has the following abbreviations 'CBL' and 'crassi'. This same rectangular label has the number '4' in the bottom left-hand corner; this is the figure number on the plate in Cameron (1890). A red-edged circular label with the printed word 'Holotype' in the centre has been attached to the holotype, together with the determination label 'HOLOTYPE of *Trybliographa crassicornis* Cam. det. J. Quinlan. 1973.'

Identity. This valid species clearly belongs in the genus *Trybliographa* Förster and this combination is herein confirmed.

Trybliographa nigricornis Cameron, 1883 : 369. LECTOTYPE ♀, GREAT BRITAIN: Scotland, Lanarkshire, Clober Wood (BMNH, ex coll. Cameron), here designated.

Paralectotype. GREAT BRITAIN: 1 ♂, Scotland, Kirkcudbrightshire, Dalry [labelled Dalry], (BMNH, ex coll. Cameron).

The lectotype has the BMNH accession label 'Cameron 96-76 Clober Wood'. A further label in Cameron's handwriting is attached to the lectotype and reads 'Clober' and 'nigricornis Cam'. A circular purple-edged label with the printed word 'Lectotype' in the centre has been added, together with the determination label 'LECTOTYPE of *Trybliographa nigricornis* Cam. det. J. Quinlan. 1973.'

Identity. **Syn. n.** of *Trybliographa atra* (Hartig, 1840 : 201) (*Cothonaspis*), Holotype ♀, GERMANY (ZSBS, Munich) [examined].

Trybliographa testaceipes Cameron, 1883 : 370. Holotype ♀, GREAT BRITAIN: Scotland, Ayrshire, Dalry (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Dalry'. The original rectangular card mount has the name 'testaceipes' on the underside and the number '8' on the upper surface. This number is the figure number on the plate in Cameron (1890). A further label 'testaceipes' in Cameron's handwriting is attached. A red-edged circular label with the printed word 'Holotype' has been attached, together with a determination label 'HOLOTYPE of *Trybliographa testaceipes* Cam. det. J. Quinlan. 1973.'

Identity. Valid species of *Trybliographa* Förster.

FIGITIDAE

ANACHARITINAE

Aegilips bicolorata Cameron, 1887 : 194. Holotype ♂, GREAT BRITAIN: England [publ. as probably London district], (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76'. On the reverse side of this label is the name 'bicolorata'. Two further labels with the name 'bicolorata' in Cameron's handwriting are attached to the holotype. A label with the number '5' is attached to the holotype; this is the figure number on the plate in Cameron (1890). The holotype has a label 'B.M. Type Hym. 7. 39', together with a determination label 'B.M. Type Hym. *Aegilips bicolorata* Cameron. 1887.' Both forewings are damaged at the apices.

Identity. Valid species in the genus *Aegilips* Walker.

Aegilips ruficornis Cameron, 1883 : 372. Holotype ♀, GREAT BRITAIN: Scotland, Renfrewshire, Bishopton (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Bishopton'. On the reverse side of this label is the name 'ruficornis'.

Further labels are attached and read 'Bishop' and 'ruficornis'; both are in Cameron's handwriting. A label with the number '8' is also attached; this number is the figure number on the plate in Cameron (1890). The holotype bears a BMNH Type Hym. 7.40. label. A further label 'B.M. Type Hym. *Aegilips ruficornis* Cameron. 1883' is attached to the holotype.

Identity. Valid species in the genus *Aegilips* Walker.

Aegilips scotica Cameron, 1883 : 372. LECTOTYPE ♂, GREAT BRITAIN: Scotland, Inverness-shire, Glenmoriston (BMNH, ex coll. Cameron), here designated.

Paralectotype. 1 ♂, same data as the holotype.

The lectotype and paralectotype have the BMNH accession label 'Cameron 96-76'. The lectotype has a label 'scotica' in Cameron's handwriting. A purple-edged circular label with the printed word 'Lectotype' has been added, together with a determination label 'LECTOTYPE of *Aegilips scotica* Cam. det. J. Quinlan. 1973.'. The left antenna of the lectotype is damaged.

Identity. **Syn. n.** of *Xyalaspis abietina* (Thomson, 1861 : 412), holotype ♂ [publ. as ♀], SWEDEN: Ostergötthland (*Prof. Zetterstedt*) (UZI, Lund) [examined]. (One other male, not a syntype, stands under *abietina* in the UZI, Lund.)

Aegilips striolata Cameron, 1883 : 373. Holotype ♂, GREAT BRITAIN: Scotland, Stirlingshire, Mugdock near Glasgow (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76'; on the reverse side of this label is the locality 'Mugdock'. A further label with the number '3' is attached; this number is the paragraph number on the appropriate page in Cameron (1890 : 181). An additional label in Cameron's handwriting 'striolata' is attached. A red-edged circular label with the printed word 'Holotype' has been attached to the holotype, together with a determination label 'HOLOTYPE of *Aegilips striolata* Cam. det. J. Quinlan. 1973'.

Identity. Valid species in the genus *Aegilips* Walker.

ASPICERINAE

Onychia nigripes Cameron, 1879 : 112. Holotype ♀, GREAT BRITAIN: England, Suffolk, Norwich (*J. B. Bridgman*) (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76'; on the reverse side of this label is the name 'nigripes'. On the reverse side of the original card mount is the number '198' or '19S'. A further label has the number '6', which is the figure number on the plate in Cameron (1890). A determination label 'nigripes' in Cameron's handwriting is attached. No locality label is attached but according to the original description Cameron only saw one specimen collected by Bridgman. A red-edged circular label with the printed word 'Holotype' in the centre has been attached, together with a determination label 'HOLOTYPE of *Onychia nigripes* Cam. det. J. Quinlan. 1973.'.

Identity. Junior synonym of *Callaspidia defonscolombeii* Dahlbom, synonymy first established by Cameron (1890 : 177) and here confirmed by comparison of types [*defonscolombeii* holotype ♂, SWEDEN: Furillen vid Gottland (UZI, Lund)]. (This species was first described by Dahlbom (1842 : 13) as *Callaspidia De Fonscolombeii*. Dalla Torre & Kieffer (1910 : 64) were the first authors to coalesce the name to *defonscolombeii*, which is correct under the *International Code of Zoological Nomenclature*.)

FIGITINAE

Melanips femoralis Cameron, 1883 : 371. Holotype ♀, GREAT BRITAIN: Scotland, Sutherland, Bonar Bridge, vi (BMNH, ex coll. Cameron).

The holotype has the BMNH accession label 'Cameron 96-76 Bonar Bridge'. A determination label 'femoralis' and the data label 'Bonar' in Cameron's handwriting is attached to the holotype. A red-edged circular label with the printed words 'Type H. T.', together with a label 'B. M. Hym. 7.41' and a determination label 'B. M. Type Hym. *Melanips femoralis* Cameron 1883', are attached to the holotype.

Identity. Valid species of *Melanips* Giraud.

SUMMARY OF THE PRESENT NAMES DISCUSSED

New synonymy

Aegilips scotica Cameron **syn. n.** of *Xyalaspis abietina* (Thomson).
Allotria ancylocera Cameron **syn. n.** of *Alloxysta victrix* (Westwood).
Allotria pleuralis Cameron **syn. n.** of *Alloxysta testacea* (Hartig).
Allotria ruficollis Cameron **syn. n.** of *Alloxysta erythrothorax* (Hartig).
Diastrophus aphidivorus Cameron **syn. n.** of *Diastrophus rubi* (Bouché).
Eucoila proxima Cameron **syn. n.** of *Trybliographa glottiana* (Cameron).
Trybliographa nigricornis Cameron **syn. n.** of *Trybliographa atra* (Hartig).

Confirmed synonymy

Aulax graminis Cameron, junior synonym of *Aulacidea hieracii* (Bouché).
Psichacra similis Cameron, junior synonym of *Trybliographa mandibularis* (Zetterstedt).
Onychia nigripes Cameron, junior synonym of *Callaspidia defonscolombeii* Dahlbom.

New combinations

Alloxysta testacea (Hartig) **comb. n.**
Phaenoglyphis dolichocera (Cameron) **comb. n.**
Trybliographa fortinervis (Cameron) **comb. n.**
Trybliographa glottiana (Cameron) **comb. n.**
Trybliographa scotica (Cameron) **comb. n.**

Confirmed combinations

Alloxysta basimacula (Cameron).
Alloxysta caledonica (Cameron).
Alloxysta erythrothorax (Hartig).
Alloxysta megaptera (Cameron).
Alloxysta mullensis (Cameron).
Alloxysta piceomaculata (Cameron).
Trybliographa gracilicornis (Cameron).
Rhynchacis crassiclava (Cameron).

Nomina dubia

Allotria collina Cameron.
Allotria maculicornis Cameron.
Allotria perplexa Cameron.
Allotria ruficeps Cameron.
Allotria salicis Cameron.
Phaenoglyphis forticornis Cameron.
Kleditoma gracilicornis Cameron.
Kleditoma marshalli Cameron.
Kleditoma longicornis Cameron.

SUMMARY OF LECTOTYPES AND NEOTYPES DESIGNATED

Lectotypes

Aegilips scotica Cameron.
Allotria basimacula Cameron.

Allotria crassa Cameron.
Allotria dolichocera Cameron.
Allotria pleuralis Cameron.
Aulax graminis Cameron.
Eucoila gracilicornis Cameron.
Eucoila proxima Cameron.
Eucoila scotica Cameron.
Kleditoma elegans Cameron.
Psichacra similis Cameron.
Trybliographa nigricornis Cameron.

Neotypes

Kleditoma caledonica Cameron.
Kleditoma filicornis Cameron.
Kleditoma nigripes Cameron.
Psichacra dalei Cameron.
Psichacra marshalli Cameron.

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A CATALOGUE
OF THE TYPE-SPECIMENS OF
THE CETONIINAE
(COLEOPTERA : SCARABAEIDAE)
DESCRIBED BY G. J. ARROW
WITH A COMPLETE BIBLIOGRAPHY OF HIS
ENTOMOLOGICAL WORKS

M. E. BACCHUS

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MICHAEL EDWARD BACCHUS

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This paper is Vol. 31 No. 2 of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.

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TRUSTEES OF
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A CATALOGUE OF THE TYPE-SPECIMENS OF THE CETONIINAE (COLEOPTERA : SCARABAEIDAE) DESCRIBED BY G. J. ARROW

WITH A COMPLETE BIBLIOGRAPHY OF HIS
ENTOMOLOGICAL WORKS

By M. E. BACCHUS

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SYNOPSIS

A list is given of all the traceable type-specimens of the species and varieties of Cetoniinae described by Gilbert J. Arrow. The current valid name or current generic assignment is given where appropriate. Lectotypes are designated where necessary. A complete bibliography of Arrow's entomological works is included.

INTRODUCTION

FROM 1896 to 1948 Gilbert J. Arrow was employed at the British Museum (Natural History) and, during that time, described about 1800 species of Coleoptera in 24 families, mostly from material in the museum collection. He was well aware of the importance of types and always labelled one specimen (occasionally two) from a series as 'type'. However, the vague or ambiguous nature of his published type designations, when any were made at all, renders most of these 'types', except the uniques, unacceptable as holotypes by today's standards. The remainder of the series, which he called 'co-types', were rarely all labelled as such. His normal practice was to label very few, if any, of these additional specimens, whether from the collection in the British Museum (National History) or borrowed by him from elsewhere.

In the course of evaluating the type status of Arrow material for routine curation of the collection and for an increasing number of inquiries during the past few years,

it was found that the data quoted in the descriptions are rarely comprehensive. The localities given are often a *précis* of the data labels of the series. Instances have been noticed of published data, especially bionomic notes, apparently from oral sources or contemporary correspondence, not appearing on the data labels. The name of the 'collector' may be that of the donor of the collection rather than that of the actual collector(s). The number and sex of the specimens is usually omitted. These circumstances, together with the fact that a considerable number of syntypes and paratypes must have been exchanged or given away without record, make it impossible in many cases to be certain that the whole of the series is accounted for.

Without access to the collection, museum registers of donations, various journals and lists available only in the museum libraries, and some knowledge of the history of the collection and of the vagaries of Arrow's method, accurate and consistent collation of his type-series is virtually impossible.

This paper is the first of a series which will catalogue all the traceable type-specimens of species described by Gilbert Arrow. In those families which are within the specialist field of the cataloguer, lectotypes will be designated where necessary; in others the syntype series will be listed.

All specimens are in the British Museum (Natural History) except where otherwise stated. The original genus of every species is given in parenthesis after the specific name, and the current valid name, when it differs from the original, is given at the end of the entry. The number and sex of the original series is given, in square brackets, whenever possible. The data quoted are not verbatim but have been rationalized for the sake of clarity, brevity and convenience to users. Where possible the present name of the country of origin is used and all available data arranged in a standard form. The museum registration numbers have been omitted as they are of no use without the relevant registers.

The specimens labelled by Arrow as 'type' have, until now, all been regarded as holotypes and all bore the round, red-bordered type labels in use in this museum. Where lectotypes are necessary they will, except where otherwise stated, be these specimens. Normally when both male and female 'types' were so-labelled by Arrow the male will be designated lectotype.

Every specimen catalogued in this series of papers will have a round label edged in red (holotype), yellow (paratype), purple (lectotype) or blue (paralectotype or syntype) as appropriate and a label with the name of the taxon written by the cataloguer and with his name printed below.

The bibliography of this part of the catalogue is in the form of a complete list of the entomological works of Gilbert Arrow. Future parts will have a bibliography pertaining to that part only.

ABBREVIATIONS

BMNH	British Museum (Natural History), London.
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels.
MCSN	Museo Civico di Storia Naturale, Genoa.

MNHN	Muséum National d'Histoire Naturelle, Paris.
NR	Naturhistoriska Riksmuseum, Stockholm.
RHN	Rijksmuseum van Natuurlijke Historie, Leiden.
UM	University Museum, Oxford.
ZSI	Zoological Survey of India, Calcutta.

ACKNOWLEDGEMENTS

I am indebted to Dr R. Damoiseau, Dr J. Krikken, Dr P. I. Persson, Mons. G. Ruter, Dr T. Sen Gupta, Mr E. Taylor and Dr E. Tortonese for data from their collections or the loan of specimens. I also thank Mr R. D. Pope for much helpful advice and Miss V. I. Dick for preparing the index of species described by Gilbert Arrow on which this catalogue is based.

CATALOGUE OF THE TYPE-SPECIMENS OF THE
CETONIINAE DESCRIBED BY G. J. ARROW

acutangula (Charadronota), 1922b : 529. LECTOTYPE ♂, CAMEROUN: Dendeng, 16.iv.1914; here designated.

Paralectotypes. UGANDA: 1 ♂, Mabira Forest, Chagwe, 3500–3800 ft, 16–25.vii.1911 (S. A. Neave); 2 ♂, Budongo Forest, Unyoro, 3400 ft, 11–15.xii.1911 (S. A. Neave).

acutipes (Coenochilus), 1910c : 210. Holotype ♀, INDIA: Bombay, Igatpuri, 20.vi.1904 (H. M. Lefroy) [Elytra and scutellum on separate card, pygidium detached and mounted on same card as remainder of specimen.]

angustata (Coilodera), 1946c : 144 [original series: 2]. LECTOTYPE ♂, SUMATRA (J. R. Grey); here designated.

Paralectotype. SUMATRA: 1 ♂, Sungei Kumbang, Korinchi, 4500 ft, iv. 1914.

auritus (Mycteristes), 1910c : 39. Holotype ♂, INDIA: Nilgiri Hills (H. L. Andrewes).

Paratype. INDIA: 1 ♂, same data as holotype.

aurora (Glycyphana), 1941c : 84. LECTOTYPE ♂, SOLOMON ISLANDS: [Florida Island], Tulagi, Antigone [sic] flowers, 5.x.1934 (H. T. Pagden); here designated.

Paralectotypes. SOLOMON ISLANDS: 5 ♂, 1 ♀, same data as lectotype; 2 ♂, same data as lectotype but 16.ix.1934; 2 ♂, Tulagi, Antigone [sic], 12.viii.1933 (H. T. Pagden); 2 ♂, 1 ♀, Tulagi, 26.i.1934 (H. T. Pagden); 1 ♂, 1 ♀, Tulagi Ridge, 13.viii.1934 (H. T. Pagden); 1 ♀, Tulagi, 22.vii.1934 (R. A. Lever).

aurocincta (Glycyphana), 1910c : 122. Holotype ♂, BHUTAN: 1898 (L. Durel).

Paratypes. BHUTAN: 2 ♂ [not ♀ as stated by Arrow], 1 ♀, same data as holotype (MNHN, Paris).

aurulenta (Glycyphana horsfieldi var.), 1910c : 121. LECTOTYPE ♀, INDIA; here designated.

[No indication of number of original specimens; one only found.]

bhutanus (Oreoderus), 1910c : 225. LECTOTYPE ♂, BHUTAN: 1898 (L. Durel); here designated.

Paralectotypes. BHUTAN: 5 ♂ (BMNH, London), 4 ♂ (MNHN, Paris), same data as lectotype; 2 ♂, 2 ♀ (BMNH, London), 5 ♂, 2 ♀ (MNHN, Paris), Maria Basti (L. Durel).

bidentipes (Protaetia), 1907c : 351 [original series: 1 ♂, 2 ♀]. LECTOTYPE ♀, NICOBAR IS. (*G. Rogers*); here designated.

Paralectotypes. 1 ♀, same data as lectotype; 1 ♂, Rangoon, Andaman Is. [*sic*] (ZSI, Calcutta) [Arrow says that this specimen is no doubt wrongly labelled].

binghami (Protaetia), 1910c : 156. Holotype ♀, BURMA: Tenasserim.

Paratype. BURMA: 1 ♀, Tenasserim (*Captain Bingham*) (RNH, Leiden).

biplagiata (Glycosia), 1907c : 351. Holotype ♀, ANDAMAN IS. (*Roepstorff*).

Paratype. 1 ♂, Rangoon [*sic*] [Arrow says that this specimen is 'labelled "Rangoon", probably by mistake'].

bryanti (Oreovalgus), 1944f : 228. Holotype ♂, SARAWAK: Quop, 11.iv.1914 (*G. E. Bryant*).

bufo (Anthracophora), 1907c : 353. Holotype ♂, INDIA: Sylhet (*Bowring*).

bufo (Charitovalgus), 1944f : 231. Holotype ♀, LAOS: Taeviang, 15.vii.1919 (*R. Vitalis de Salvaza*).

bufo (Macronota), 1910c : 54. LECTOTYPE ♀, INDIA: Travancore Tea Co. (*G. S. Imray*); here designated.

carbonarius (Dasyvalgus), 1910c : 239. LECTOTYPE ♂, INDIA: Kurseong (*Verschraeghen*); here designated.

Paralectotypes. INDIA: 1 ♂, same data as lectotype. BURMA: 1 ♂ (BMNH, London), 1 ♂ (RNH, Leiden), 3 ♂ (MNHN, Paris), Ruby Mines, 1200–2300 m, 1890 (*Doherty*).

[The single female Burma: Ruby Mines (*Doherty*) described by Arrow is not designated as a paralectotype because Arrow is indefinite about the association with the males.]

[The collection of Baron P. de Moffarts, which contains more syntypes, has not been traced.]

cataphracta (Protaetia), 1913d : 405 [original series: 12]. LECTOTYPE ♂, JAPAN: Kuri-gahara, Usui Pass, in flowers, 5.viii.1881 (*G. Lewis*); here designated.

Paralectotypes. JAPAN: 3 ♀, Junsai Lake (*G. Lewis*); 2 ♀, Kashiwagi, 15–24.vi.1881 (*G. Lewis*); 1 ♀, Nikko (*G. Lewis*); 1 ♀, 'Japan'.

catena (Glycyphana), 1910c : 122 [original series: 3 ♂]. Holotype ♂, INDIA: Darjeeling.

Paratype. SIKKIM: 1 ♂ (ZSI, Calcutta).

[One other male paratype should be in the Oberthür Collection (MNHN, Paris) but could not be found in a recent search by Mons. G. Ruter.]

caudata (Protaetia), 1910c : 147. LECTOTYPE ♀, SIKKIM: Kurseong, 1894 (*R. P. Bretandeanu*); here designated.

Paralectotypes. SIKKIM: 2 ♀, environs de Kurseong (*R. P. Bretandeanu*) (MNHN, Paris).

[No specimens from Bhutan: Maria Basti, or India: Darjeeling have been found.]

clypealis (Oreoderus), 1944f : 242. Holotype ♂, BURMA: Sadon, 1200 m, 28.vi–5.vii. (*R. Malaise*).

cobaltinus (Leucocelis), 1909a : 521. LECTOTYPE ♂, RHODESIA: 'Gazaland', Chirinda Forest, iii.1907 (*D. Odendaal*); here designated.

Paralectotypes. RHODESIA: 2 ♀, 'Mashonaland', Chirinda Forest, iii.1907 (*G. A. K. Marshall*); 1 ♀, 'Gazaland', nr Chirinda Forest, iii.1907 (*G. A. K. Marshall*).

[By modern definition, Chirinda Forest is not in Gazaland or Mashonaland. It is 110 miles south of Umtali.]

coorgica (Macronota), 1941c : 82. LECTOTYPE ♂, INDIA: North Coorg, Santikoppa, 4–10.v.1914 (*Fletcher*); here designated.

Paralectotypes. INDIA: 1 ♂, North Coorg, Sonawarpet, 9.vii.1913 (*L. Newcome*); 1 ♂, Coorg, Sidapur, 14.iii.1917 (*T. R. N.*); 1 ♀, Coorg, Sidapur, 3000 ft, 28.iv.1917 (*T. R. N.*).

coriaceus (*Dasyvalgus*), 1944 f : 236. Holotype ♂, MALAYA: Pahang, Gunong Tahan, Padang, 5500 ft, 11.xii.1922 (*H. M. Pendlebury*).

Paratypes. MALAYA: 1 ♂, Pahang, Gunong Tahan, Seat Point, 5460 ft, 27.xii.1922 (*H. M. Pendlebury*); 1 ♂, as above, except 20.xii.1922; 3 ♂, Perak Mts (*Doherty*).

crassipes (*Genuchus*), 1926b : 650. Holotype ♀, KENYA: Maramas District, 14 mls E. of Mumias, Ilala, 4500 ft, 18-21.vi.1911 (*S. A. Neave*).

crassipes (*Oreoderus*), 1944b : 243. Holotype ♀, INDIA: Dehra Dun, Karwapan, 14.xii.1910 (*F. Z.*).

croesus (*Charitovalgus*), 1944 f : 230. Holotype ♂, LAOS: Haut Mekong, Muong Sing, 18.iv.1918 (*R. V. de Salvaza*).

dimorpha (*Clinteria*), 1916c : 497 [original series: 3 ♂, 2 ♀ (see below)]. LECTOTYPE ♂, MOLUCCAS: Larat Island, xii.1907 (*F. Muir*); here designated.

Paralectotype. MOLUCCAS: 1 ♂, Larat (*F. Muir*).

[The 2 ♀ specimens mentioned by Arrow are excluded from the paralectotype series because it is definitely stated that their association with the males is uncertain. There is one female only, with same data as paralectotype, in BMNH, London.]

dispar (*Anagnathocera*), 1922b : 525. LECTOTYPE ♂, RHODESIA: 'Mashonaland', Chirinda Forest, x. 1905 (*G. A. K. Marshall*); here designated.

Paralectotypes. RHODESIA: 1 ♂, 'Gazaland', Chirinda Forest, x. 1905 (*G. A. K. Marshall*); 1 ♀, 'Gazaland' (*D. Odendaal*).

[By modern definition, Chirinda Forest is not in Gazaland or Mashonaland. It is 110 miles south of Umtali.]

dispar (*Heterorrhina*), 1907c : 347 [original series: 1 ♂, 1 ♀]. LECTOTYPE ♂, INDIA: 'N. Ind.'; here designated.

Paralectotype. 1 ♀, same data as lectotype.

disparilis (*Glycyphana*), 1916c : 497 [original series: 6 ♂, 4 ♀]. LECTOTYPE ♂, MOLUCCAS: Larat Island, xii.1907 (*F. Muir*); here designated.

Paralectotypes. MOLUCCAS: 2 ♂, same data as lectotype; 2 ♂, 3 ♀, same data as lectotype but no date.

Current valid name: *Glycyphana maculiceps* Moser (Arrow, 1941b : 79).

elgonensis (*Endoxazus*), 1941c : 86 [original series: 3]. LECTOTYPE ♂, KENYA: Mt Elgon, 11 550 ft, ii. 1935 (*F. W. Edwards*); here designated.

Paralectotypes. KENYA: 2 ♂, same data as lectotype.

Current valid name: *Glaphyronyx bayeri* Moser (Burgeon, 1946, *Revue fr. Ent.* 13 : 111).

eximia (*Charadronota*), 1922b : 528 [original series: 1 ♂, 1 ♀]. LECTOTYPE ♂, UGANDA: Entebbe, 22.ii.1914; here designated.

Paralectotype. UGANDA: 1 ♀, Tero, 19.iv.1911.

eximia (*Macronota*), 1941c : 80. LECTOTYPE ♂, MALAYA: Pahang, Cameron Highlands, 6040 ft, 8.v.1939 (*G. Berumban*); here designated.

Paralectotypes. MALAYA: 2 ♂, 2 ♀, same data as lectotype but 6036 ft, 21.v.1939; 1 ♂, Pahang, Cameron Highlands, Rhododendron Hill, 5200 ft, 21.vi.1933.

felix (*Clinteria klugi* var.), 1910c : 187 [original series: 3]. LECTOTYPE ♂, INDIA (*Colonel Buckley*); here designated.

Paralectotypes. INDIA: 2 ♀, same data as lectotype.

felix (*Genuchus*), 1926b : 651. Holotype ♀, UGANDA: Tero Forest, 4.vii.1912 (*C. C. Gowdey*).

fenestrata (*Coilodera*), 1946c : 143 [original series: 4]. LECTOTYPE ♂, SUMATRA: Medan; here designated.

Paralectotypes. SUMATRA: 2 ♂, same data as lectotype. MALAYA: 1 ♀, Selangor (*H. C. Robinson*).

festivus (Trichius), 1910c : 252. LECTOTYPE ♀, BURMA: Ruby Mines (*Doherty*); here designated. [Although Arrow described the male only and said that the female was unknown, this specimen bears Arrow's 'Type' label with ♂ crossed out. It also bears a printed ♀ label. No other specimens found.]

festivus Arrow var. **funebnis (Trichius)**, see *funebnis*.

flavipennis (Microvalgus), 1944f : 245 [original series: 2 ♂]. LECTOTYPE ♂, AUSTRALIA: New South Wales, North Sydney, 1.xii.1908 (*G. E. Bryant*); here designated.

Paralectotype. AUSTRALIA: 1 ♂, New South Wales, Jervis Bay, on flowers of *Leptospermum scoparium*, xi.1924 (*F. A. Rodway*).

fulvicauda (Dasyvalgus), 1910c : 242 [original series: 5 ♂]. LECTOTYPE ♂, BURMA: Karen Mts (*Doherty*); here designated.

Paralectotypes. BURMA: 4 ♂, same data as lectotype.

funebnis (Trichius festivus var.), 1910c : 253. No specimens found.

gestroi (Mycteristes), 1910c : 38. Holotype ♂, BURMA: Carin Chebà, 900–1100 m, xii.1888 (*L. Fea*) (MCSN, Genoa).

Paratype. BURMA: 1 ♀, same data as holotype (MCSN, Genoa).

gracilis (Heterorrhina), 1910c : 96. LECTOTYPE ♂, INDIA: Nilgiri Hills (*H. L. Andrewes*); here designated.

Paralectotypes. INDIA: 2 ♀, same data as lectotype.

gracilis (Macronota), 1907c : 350. LECTOTYPE ♀, INDIA: Assam, Nagas (*Doherty*); here designated.

Paralectotype. INDIA: 1 ♀, same data as lectotype.

gravis (Oreoderus), 1910c : 228. LECTOTYPE ♂, INDIA: Nilgiri Hills (*H. L. Andrewes*); here designated.

Paralectotypes. INDIA: 3 ♂, 1 ♀, same data as lectotype; 1 ♂, Nilgiri Hills, O. Valley, 3500 ft, 11.vii. (*H. L. Andrewes*); 1 ♂, 'S. Ind.'; 1 ♀, Travancore State, Madras, Pirmaid, 9°36'N. 77°E., 1900–1902 (*Mrs Imray*) (UM, Oxford).

griseus (Podovalgus), 1910c : 230. LECTOTYPE ♂, INDIA: Barway (*P. Cardon*) (IRSNB, Brussels); here designated.

Paralectotypes. INDIA: 4 ♂, 3 ♀ (IRSNB, Brussels), 1 ♀ (RHN, Leiden), 2 ♂, 1 ♀ (BMNH, London), same data as lectotype; 1 ♂, 3 ♀, Bengal (IRSNB, Brussels).

[Although Arrow states that the type of this species is in the BMNH, London, the specimens labelled 'Type ♂' and 'Type ♀' by Arrow are both in IRSNB, Brussels, the male being the lectotype.]

hondana (Protaetia), 1913d : 404. Holotype ♂, JAPAN: Kobe, Harada, 8.vii.1913.

Paratypes. Neither the monstrosus specimen from Tanegashima (BMNH, London) or the example from Hiroshima (RHN, Leiden) could be found.

Current valid name: *Protaetia lenzi* (Harold) (Arrow, 1914c : 79).

horsfieldi (Hope) var. **aurulenta (Glycyphana)**, see *aurulenta*.

hystrix (Dasyvalgus), 1910c : 241. LECTOTYPE ♂, INDIA: Assam, Patkai Mts (*Doherty*); here designated.

Paralectotypes. INDIA: 4 ♀, same data as lectotype.

ichthyurus (Leucocelis), 1909a : 521. LECTOTYPE ♂, RHODESIA: 'Mashonaland', Chirinda Forest, 22–24.ii.1907 (*C. F. M. Swynnerton*); here designated.

Paralectotypes. RHODESIA: 6 ♂, 5 ♀, same data as lectotype; 9 ♂, 1 ♀, 'Gazaland', Chirinda Forest, iii.1907 (*D. Odendaal*); 2 ♂, 1 ♀, as previous, but no date; 5 ♂, 1 ♀, 'Gazaland', nr Chirinda Forest, iii.1907 (*G. A. K. Marshall*); 2 ♂, 1 ♀, as previous, but no date; 3 ♂, 'Gazaland' Mt Chirindi, xii.1901 (*G. Marshall*); 1 ♀, 'Gazaland', Mt Chirindi, 1-3.i.1907 (*D. Odendaal*); 1 ♂, 'Mashonaland', Mt Chirinda, xii.1901 (*G. A. K. Marshall*); 1 ♂, Chirinda (*C. F. M. Swynnerton*); 1 ♀, 'Mashonaland', Chirinda Forest, 3800 ft, 22.ii.1907 (*C. F. M. Swynnerton*); 1 ♂, Mashonaland, Salisbury (*G. A. K. Marshall*).

[By modern definition, Chirinda Forest is not in Gazaland or Mashonaland. It is 110 miles south of Umtali.]

inscriptus (*Trichius*), 1938c : 3 [original series: 2 ♂, 1 ♀]. Holotype ♂, BURMA: Seinkhu Valley, Wang, 28°5'N. 97°35' E., 5000 ft, 19.v.1926 (*F. Kingdon Ward*).

Paratypes. BURMA: 1 ♂, same data as holotype; 1 ♀, Kambaiti, 7000 ft, 4-8.vi.1934 (*R. Malaise*) (NR, Stockholm).

insularis (*Dasyvalgus*), 1910c : 240. LECTOTYPE ♂, NICOBAR ISLANDS: (*Roepstorff*); here designated.

Paralectotype. 1 ♀, ANDAMAN ISLANDS (*Captain Wimberley*).

jansoni (*Macronota*), 1910c : 64. LECTOTYPE ♀, SIKKIM; here designated.

Paralectotypes. INDIA: 1 ♂, 1 ♀, Khasis [Hills], v. 1896 (MNHN, Paris).

[The male specimen in MNHN, Paris has not been designated lectotype because the female in BMNH, London has been labelled as, and used as, the holotype since 1910.]

jansoni (*Platysodes*), 1910c : 200. Holotype ♂, INDIA: Assam, Khasi Hills, 1899 (native collected).

kanarensis (*Dasyvalgus*), 1910c : 245. LECTOTYPE ♂, INDIA: Kanara; here designated.

Paralectotypes. INDIA: 4 ♂, same data as lectotype.

kenyensis (*Endoxazus*), 1941c : 87 [original series: 4]. Holotype ♂, KENYA: Mt Kenya, 8500-9700 ft, 23.iv.1935 (*G. L. R. Hancock*).

Paratypes. KENYA: 3 ♀, same data as holotype.

Current valid name: *Glaphyronyx kenyensis* (Arrow) (Burgeon, 1946, *Revue fr. Ent.* **13** : 111).

kinabaluana (*Macronota*), 1932a : 127. LECTOTYPE ♂, BORNEO: Mt Kinabalu, Lumu Lumu, 5500 ft, 16.iv.1929 (*H. M. Pendlebury*); here designated.

Paralectotypes. BORNEO: 1 ♀, same data as lectotype; 1 ♀, same data as lectotype, but 9.iv.1929; 1 ♂, same data as lectotype, but 7.iv.1929.

klugi (Hope) var. **felix** (*Clinteria*), see *felix* (*Clinteria*).

laetus (*Chromovalgus*), 1913d : 408. LECTOTYPE ♂, JAPAN: Luchu Islands, Oshima, 17.v.1913; here designated.

Paralectotypes. JAPAN: 2 ♂, same data as lectotype; 1 ♂, same data as lectotype but 16.v.1913.

Current valid name: *Charitovalgus laetus* (Arrow) (Arrow, 1944f : 230).

laevis (*Glyptothoe*), 1932a : 126. LECTOTYPE ♂, BORNEO: Mt Kinabalu, Lumu Lumu, 5500 ft, 15.iv.1929 (*H. M. Pendlebury*); here designated.

Paralectotypes. BORNEO: 1 ♂, same data as lectotype, but 7.iv.1929; 1 ♂, same data as lectotype, but 16.iv.1929; 1 ♀, same data as lectotype, but 8.iv.1929.

laeiventris (*Cetonia*), 1910c : 134. LECTOTYPE ♂, INDIA: Manipur (*Doherty*); here designated.

Paralectotypes. INDIA: 2 ♂, 2 ♀, same data as lectotype.

laticollis (*Hybovalgus*), 1944f : 238 [original series: 2]. LECTOTYPE ♂, CHINA: Wei-hai wei, on Oak, 25.iv.1899 (*T. B. Fletcher*); here designated.

Paralectotype. CHINA: 1 ♀.

latipennis (Myoderma), 1941c : 84. Holotype ♀, SIERRA LEONE: Njala, 20.v.1930 (*E. Hargreaves*).

latipes (Oreoderus), 1944f : 243. Holotype ♂, VIETNAM (NORTH): Tonkin, Hoabinh (*A. de Cooman*).

lobata (Macronota), 1932a : 128 [original series: 1 ♂, 2 ♀]. LECTOTYPE ♂, BORNEO: Kinabalu, Lumu Lumu, 5500 ft, 16.iv.1929 (*H. M. Pendlebury*); here designated.

Paralectotypes. BORNEO: 1 ♀, same data as lectotype, but 8.iv.1929; 1 ♀, Mt Kinabalu, Kamborangah, 7000 ft, 26.iii.1929 (*H. M. Pendlebury*).

longicollis (Microvalgus), 1944f : 245. Holotype, ZAIRE: Ituri, 1918 (*L. Burgeon*).

longipennis (Protaetia), 1910c : 146 [original series: 2]. Holotype ♀, BURMA: Monti Cariani, 1892 (*D. Tornatore*) (MCSN, Genoa).

[The second specimen seen by Arrow could not be found in the O. E. Janson Collection (RHN, Leiden).]

luridus (Calometopus), 1922b : 532. Holotype ♂, MALAWI: Mt Mlange, 30.x.1913 (*S. A. Neave*).

malaisei (Trichius), 1938c : 4. Holotype ♂, BURMA: Kambaiti, 7000 ft, 22.vi.1934 (*R. Malaise*) (NR, Stockholm).

Paratypes. BURMA: 1 ♀, same data as holotype; 1 ♀, same data as holotype but 4-8.vi.1934 (NR, Stockholm); 1 ♀, same data as holotype, but 28.v.1934 (NR, Stockholm); 1 ♂, same data as holotype but 2000 m, 28.v.1934; 2 ♂, 'N. E. Burma' (*R. Malaise*).

maritimus (Oreoderus), 1944f : 241 [original series: 8]. LECTOTYPE ♂, MALAYA: Langkawi Islands, 1.v.1928 (*H. M. Pendlebury*); here designated.

Paralectotypes. MALAYA: 1 ♂, 1 ♀, same data as lectotype; 1 ♂, 1 ♀, same data as lectotype, but 22.iv.1928; 1 ♀, same data as lectotype, but 26.iv.1928. BURMA: 1 ♂, Rangoon, v-vi.1887 (*Fea*).

mashunus (Eccoptocnemis), 1909a : 520. LECTOTYPE ♂, RHODESIA: Mashonaland (*H. B. Dobbie*); here designated.

Paralectotypes. RHODESIA: 1 ♂, same data as lectotype; 1 ♂, same data as lectotype, but (*F. Brooks*); 1 ♀, Mashonaland, Salisbury, xi.1897 (*G. A. K. Marshall*); 1 ♀, as previous, but on *Cassia* pods, xi. 1899.

militaris (Dasyvalgus), 1910c : 237. Holotype ♂ [not ♀ as stated by Arrow], INDIA: Niligiri Hills (*G. F. Hampson*).

minus (Dasyvalgus), 1910c : 244. LECTOTYPE ♂, BURMA: Karen Mts (*Doherty*); here designated.

Paralectotypes. BURMA: 5 ♂, same data as lectotype; 1 ♂, Ruby Mines (*Doherty*); 6 ♂, as previous, but 5500-7500 ft.

momeitensis (Oreoderus), 1910c : 224. Holotype ♂, BURMA: État de Momeit, 600 m, 1890 (*Doherty*).

Paratypes. BURMA: 2 ♂, same data as holotype (BMNH, London; MNHN, Paris).

monstrosus (Placodidus), 1926b : 648. Holotype ♂, TANZANIA: Dodoma, 1918 (*H. L. Andrewes*).

nanus (Xenoreoderus), 1944f : 240 [original series: 6]. LECTOTYPE ♂, BURMA: Yedashe, 9.iii.1918 (*A. G. R.*); here designated.

Paralectotypes. BURMA: 5 ♂, same data as lectotype.

nasalis (Genuchus), 1926b : 650. LECTOTYPE ♀, UGANDA: shores of L. Isolt or Wamala, 3800 ft, 7-8.i.1912 (*S. A. Neave*); here designated.

Paralectotype. UGANDA: Kampala, 17.x.1915 (*C. C. Gowdey*).

nigra (*Myoderma*), 1901e : 258 [original series: 2]. LECTOTYPE ♂, CAMEROUN: here designated.

Paralectotype. 1 ♂, same data as lectotype.

nigrolineata (*Gnathocera*), 1922b : 526. Holotype ♀, GUINEA: Kondia.

nitidicauda (*Trichius*), 1938c : 2. Holotype ♂, BURMA: Kambaiti, 7000 ft, 3.v.1934 (*R. Malaise*) (NR, Stockholm).

Paratypes. BURMA: 1 ♀, same data as holotype, but 8.vi.1934 (NR, Stockholm); 1 ♂, same data as holotype, but 12.iv.1934; 1 ♂, same data as holotype, but 2000 m, 2.vi.1934.

nitidus (*Coenochilus*), 1910c : 210. Holotype ♂, INDIA: Bombay.

Paratype. INDIA: Kanara (*H. E. Andrewes*).

oberthuri (*Clinteria*), 1910c : 181. LECTOTYPE ♂, SIKKIM: Kurseong, 1934 (*R. P. Bretandeau*); here designated.

Paralectotypes. SIKKIM: 1 ♂, same data as lectotype (MNHN, Paris); 1 ♂, environs de Kurseong (*R. P. Bretandeau*) (MNHN, Paris).

occidentalis (*Xenoreoderus*), 1910c : 233. LECTOTYPE ♀, INDIA: Belgaum, Bombay; here designated.

Paralectotypes. INDIA: 1 ♀, same data as lectotype; 5 ♀, Belgaum.

opacicauda (*Coelocorynus*), 1926b : 654 [original series: 3 ♂]. LECTOTYPE ♂, KENYA: Aberdare Mts, 10 000 ft, vii.1919 (*H. L. Andrewes*); here designated.

Paralectotypes. KENYA: 2 ♂, same data as lectotype.

opacipennis (*Leucocelis*), 1909a : 522. Lectotype ♂, ZAIRE: 150–200 miles W. of Kambove, 3500–4500 ft, 24.ix.1907 (*S. A. Neave*); designated by Ruter (1967, *Rev. Zool. Bot. afr.* **76** : 42).

Paralectotypes. ZAIRE: 6 ♀, same data as lectotype.

ovaliceps (*Macronota*), 1941c : 83. Holotype ♂, BURMA: Sima, 16.viii.1918 (*P. M. R. Leonard*).

ovicollis (*Dasyvalgus*), 1910c : 242. Holotype ♂, BURMA: Ruby Mines (Doherty).

Paratypes. BURMA: 2 ♂ (BMNH, London), 3 ♂ (MNHN, Paris), same data as holotype but 1220–2300 m, 1890.

peninsularis (*Acanthovalgus*), 1944f : 232 [original series: 1 ♂, 2 ♀]. LECTOTYPE ♂, MALAYA: Pahang, Cameron Highlands, Gunong Tesar, 5565 ft, 20.v.1939 (*H. M. Pendlebury*); here designated.

Paralectotypes. MALAYA: 2 ♀, Pahang Cameron Highlands, 5000 ft.

planata (*Heterorrhina*), 1910c : 94. LECTOTYPE ♂, INDIA; here designated.

Paralectotypes. INDIA: 3 ♂, Nilgiri Hills 1 ♂, Kanara (*T. R. Bell*); 1 ♀, Kanara; 3 ♂, Mercara Coorg, 24.vii.1905 (*H. M. Lefroy*); 1 ♀, Malabar, Nagdani.

planissimus (*Placodidus*), 1926b : 649. Holotype ♀, RHODESIA: Lukosi, ii. 1905.

polychrous (*Dasyvalgus*), 1944f : 235 [original series: 6 ♂]. LECTOTYPE ♂, BORNEO: W. Sarawak, Mt Matang, 3000 ft, 20.xii.1913 (*G. E. Bryant*); here designated.

Paralectotypes. BORNEO: 1 ♂, same data as lectotype, but 1000 ft, 11.ii.1914; 1 ♂, same data as lectotype, but 1000 ft, 12.ii.1914; 1 ♂, Sarawak, Bau Mantang, via Single, 12–20.v.1909 (*C. J. Brooks*); 1 ♂, Sarawak, Matang, 10.v.1909 (*C. J. Brooks*). [Arrow gives the date as 'Nov.' despite the fact that the specimen labelled by him as 'type' is clearly '20.xii.1913'. It appears that he read the 'ii' on the other two specimens collected by Bryant as '11'.]

prunina (*Protaetia*), 1910c : 147. LECTOTYPE ♀, BURMA: Moulmein (*Weston*); here designated.

Paralectotype. BURMA: 1 ♀, same data as lectotype. [Specimen(s) from Yun-za-lin missing.]

pubescens (*Glyptotheca*), 1932a : 126 [original series: 8 ♂]. LECTOTYPE ♂, BORNEO: Mt Kinabalu, Lumu Lumu, 5500 ft, 8.iv.1929 (*H. M. Pendlebury*); here designated.

Paralectotypes. BORNEO: 1 ♂, same data as lectotype, but 14.iv.; 1 ♂, same data as lectotype, but 28.iv.1929; 1 ♂, same data as lectotype, but 30.iv.1929; 1 ♂, same data as lectotype, but 2.v.1929; 1 ♂, Mt Kinabalu, Kamborangah, 8000 ft, 3.iv.1929; 1 ♂, Mt Kinabalu, Marei Parei, 5000 ft, 27.iv.1929.

pulchellus (*Cymophorus*), 1910c : 203. LECTOTYPE ♂, INDIA: Chota Nagpore, Barway (*R. P. Cardon*); here designated.

Paralectotypes. INDIA: 1 ♀, same data as lectotype (MNHN, Paris); 2 ♂, Chota Nagpore, Nowatoli (*R. P. Cardon*) (MNHN, Paris); 1 ♀, Chota Nagpore, Chandernagore (*R. P. Cardon*) (RNH, Leiden).

pusilla (*Myoderma*), 1906b : 135. LECTOTYPE ♂, ANGOLA: Bihe; here designated.

Paralectotypes. ANGOLA: 5 ♂, same data as lectotype; 2 ♂, Loanda, Pundo Andongo (*Dr Ansorge*).

pusillus (*Callinomenes*), 1910c : 216 [original series: 3]. LECTOTYPE ♂, INDIA: Assam, North-West Frontier; here designated.

Paralectotype. INDIA: 1 ♀, Patkai Mts (*Doherty*).
[Specimen from Sikkim, Mungphu missing.]

pusillus (*Pogonopus*), 1910c : 117. Holotype ♂, INDIA: Coimbatore, Podanur.

pygmaea (*Heterorrhina* (*Ptychodesthes*)), 1922b : 527. LECTOTYPE ♂, RHODESIA: 'Gazaland', Chirinda Forest (*David Odendaal*); here designated.

Paralectotypes. RHODESIA: 4 ♂, same data as lectotype; 4 ♂, 'Mashonaland', Chirinda Forest, 1906 (*C. F. M. Swynnerton*); 1 ♂, 'Gazaland', nr Chirinda, viii.1907 (*G. A. K. Marshall*); 1 ♀, 'Gazaland', nr Chirinda, 3800 ft, 5-31.iii.1908.

[By modern definition, Chirinda Forest is not in Gazaland or Mashonaland. It is 110 miles south of Umtali.]

Current valid name: *Ptychodesthes alternata* Klug subsp. *pygmaea* Arrow (Schein, 1941, *Mitt. münch. ent. Ges.* 33 : 36).

quadricarinatus (*Oreoderus*), 1944f : 242. Holotype ♂, VIETNAM (NORTH): Hat Thoung 10.xi.1917.

Paratypes. 1 ♂, LAOS: Pak Neun, 1.x.1918. THAILAND: 1 ♂, Souvannaphoun, 21.ix.1918.

rana (*Protaetia*), 1910c : 153 [original series: 2 ♂, 1 ♀]. Holotype ♂, INDIA: Assam, Shillong.

Paratypes. INDIA: 1 ♂, same data as holotype; 1 ♀, Assam, Khasi Hills (RNH, Leiden).

reticulatus (*Microvalgus*), 1944f : 246 [original series: 3 ♂]. LECTOTYPE ♂, GHANA: Aburi, 1912-13 (*W. H. Patterson*); here designated.

Paralectotypes. GHANA: 2 ♂, same data as lectotype.

rotundicollis (*Macronota*), 1941c : 81. Holotype ♂, INDIA: Shevaroys, Yercaud, 4500 ft, 21.iv-4.v.1913 (*Y. R.*).

ruficauda (*Dasyvalgus*), 1944f : 237 [original series: 2 ♂]. LECTOTYPE ♂, MALAYA: Kedah Peak, 3950 ft, 27.iii.1928 (*H. M. Pendlebury*); here designated.

Paralectotype. MALAYA: 1 ♂, same data as lectotype, but 3300-3950 ft, iii.1928.

rufipennis (*Dasyvalgus*), 1944f : 235 [original series: 7 ♂]. LECTOTYPE ♂, BORNEO: W Sarawak, Mt Matang, 12.ii.1914 (*G. E. Bryant*); here designated.

Paralectotypes. BORNEO: 1 ♂, same data as lectotype, but 1000 ft, 9.ii.1914; 2 ♂, same data as lectotype, but 1000 ft, 10.ii.1914; 2 ♂, same data as lectotype, but 1000 ft, 11.ii.1914; 1 ♂, same data as lectotype, but 1000 ft, no date.

[Arrow erroneously records the date of collection as 'Nov.', interpreting 'ii' on the labels as '11'. I have confirmed from his collecting journal that Bryant was not at Mt Matang in November 1914.]

rufiventris (*Ligyromorphus*), 1901e : 257. LECTOTYPE ♂, RHODESIA: Mashonaland, Salisbury, flying at dusk, xi.1900 (G. A. K. Marshall); here designated.

Paralectotypes. RHODESIA: 1 ♂, 2 ♀, same data as lectotype; 1 ♂, 1 ♀, same data as lectotype, but no date.

Current valid name: *Diploa rufiventris* (Arrow) (Peringuey, 1907, *Trans. S. Afr. phil. Soc.* **13** : 316).

rufus (*Mimovalgus*), 1944f : 239. Holotype ♂, MALAYA: Penang (Bowring).

runsorica (*Tmesorrhina*), 1909d : 192 [original series: 1 ♂, 2 ♀]. LECTOTYPE ♂, UGANDA: Ruwenzori, 7000–8000 ft (Scott Elliot); here designated.

Paralectotype. UGANDA: 1 ♀, E. Ruwenzori, Old Camp, 6000–7000 ft, 1906 (Hon. G. Legge & A. F. R. Wollaston).

scintillans (*Trigonophorus*), 1910c : 105. LECTOTYPE ♂, INDIA: Mungphu; here designated.

Paralectotypes. INDIA: 1 ♀, same data as lectotype; 1 ♀, Darjeeling (Col. Buckley); 3 ♀ (BMNH, London), 1 ♀ 'India' (MNHN, Paris). SIKKIM: 3 ♂, 5 ♀, Kurseong, 1898 (R. P. Decoly) (MNHN, Paris); 1 ♀ (chasseurs indigenes) (MNHN, Paris).

scorpio (*Charitovalgus*), 1944f : 231. Holotype ♀, NEW GUINEA: Kokoda, 1200 ft, vii.1933 (L. E. Cheesman) ['Lower rain forest, 1300 ft' on a separate label.]

sex-dentatus (*Hybovalgus*), 1944f : 238 [original series: 3]. LECTOTYPE ♂, LAOS: Ban Naban, 16.iii.1915 (R. V. de Salvaza); here designated.

Paralectotypes. LAOS: 1 ♂, same data as lectotype; 1 ♀, Xieng Khouang, 20.iii.1915 (R. V. de Salvaza).

sobrinus (*Trichius*), 1922b : 529 [original series: 2 ♂, 5 ♀]. LECTOTYPE ♂, UGANDA: S. of L. George, 3200–3400 ft, 17–19.xi.1911 (S. A. Neave); here designated.

Paralectotypes. UGANDA: 1 ♂ (BMNH, London), 1 ♀ (RNH, Leiden), same data as lectotype; 2 ♀, Daro or Durro Forest, Toro, 4000–4500 ft, 25–29.x.1911 (S. A. Neave); 1 ♀, Mabira Forest, Chagwe, 3500–3800 ft, 16–25.vii.1911 (S. A. Neave).

Current valid name: *Pileotrichius austereus* Bourgoïn (Arrow, 1941c : 77).

solidus (*Coenochilus*), 1910c : 209 [original series: 1 ♂, 1 ♀]. Holotype ♂, BHUTAN: British Bootang, 1898 (L. Durel).

Paratype. BHUTAN: 1 ♂, British Bootang, Padong (MNHN, Paris).

spectralis (*Stripsipher*), 1926b : 652. Holotype ♂, SOUTH AFRICA: Pondoland, Port St John, ix.1923 (R. E. Turner).

striata (*Myoderma*), 1941c : 85. Holotype ♂, TANZANIA: 35 miles E. of Singida, Msagaa, x–xii.1935 (E. Burt).

Paratypes. TANZANIA: 3 ♂, same data as holotype.

subopaca (*Anomalocera*), 1907c : 348 [original series: 6]. LECTOTYPE ♂, INDIA: Manipur (Doherty); here designated.

Paralectotypes. INDIA: 5 ♀, same data as lectotype.

Current valid name: *Rhomborrhina olivacea* Janson subsp. *subopaca* (Arrow) (Mikšić, 1967, *Ent. Abh. Mus. Tierk. Dresden* **35** : 304).

succo (*Oreoderus*), 1944f : 243. LECTOTYPE ♂, INDIA: Coorg, Sidapur, 1.x.1917 (T. R. N.); here designated.

Paralectotypes. INDIA: 1 ♂, same data as lectotype, but 14.iii.1917; 1 ♂, same data as lectotype, but 22.iv.1917; 1 ♂, same data as lectotype, but 6.v.1917; 1 ♂, same data as lectotype, but 7.v.1917.

- tessellatus** (*Dasyvalgus*), 1944f : 236. Holotype ♂, MALAYA: Cameron Highlands, Pahang, Gimling Kial, 5000 ft, 24.v.1939 (*H. M. Pendlebury*).
- tigrina** (*Glycyphana* (*Gametis*)), 1909d : 193. Holotype ♀, UGANDA: E. Ruwenzori, 6000–13 000 ft, 1906 (*Hon. G. Legge & A. F. R. Wollaston*).
Current valid name: *Phonotaenia tigrina* (Arrow) (*Schenkling*, 1921, *Coleoptm Cat.* **72** : 311).
- tonkinensis** (*Valgus*), 1944f : 229. Holotype ♀, VIETNAM (NORTH): Hoabinh (*A. de Cooman*).
Paratype. VIETNAM (NORTH): 1 ♂, same data as holotype.
- transparens** (*Calometopus*), 1922b : 530. LECTOTYPE ♂, MALAWI: Mlange, 29.xii.1913 (*S. A. Neave*); here designated.
Paralectotypes. MALAWI: 1 ♂, same data as lectotype, but 7.xi.1922; 1 ♂, same data as lectotype, but 4.xii.1912; 1 ♀, same data as lectotype, but 22.i.1913; 1 ♀, same data as lectotype, but 4.ii.1913; 1 ♀, same data as lectotype, but 6.xii.1913.
- tridens** (*Diploa*), 1906b : 136. LECTOTYPE ♂, ANGOLA: Garengaze; here designated.
Paralectotypes. ANGOLA: 2 ♀, same data as lectotype; 2 ♂, Bihe.
- tridens** (*Euryvalgus*), 1944f : 233. Holotype ♂, BORNEO: W. Sarawak, Quop, 8.iv.1914 (*G. E. Bryant*).
- truncata** (*Clinteria*), 1907c : 352. LECTOTYPE ♂, INDIA: Nilgiri Hills (*G. F. Hampson*); here designated.
Paralectotypes. INDIA: 1 ♂, same data as lectotype; 1 ♂, 1 ♀, same data as lectotype, but 6000 ft (*H. L. Andrewes*); 1 ♂, 1 ♀, same data as lectotype, but (*Captain Downing*); 4 ♂, 5 ♀, Nilgiri Hills; 1 ♀, Madras, Nilgiris, Naduvatum, 7000 ft, v.1904 (*W. Rowson*).
- turneri** (*Stripsipher*), 1926b : 652. LECTOTYPE ♂, SOUTH AFRICA: Pondoland, Port St John, xi. 1923 (*R. E. Turner*); here designated.
Paralectotypes. SOUTH AFRICA: 1 ♂, same data as lectotype; 1 ♂, 1 ♀, same data as lectotype, but ix.1923; 2 ♂, same data as lectotype, but x.1923; 2 ♂, same data as lectotype, but i.1924; 1 ♀, same data as lectotype, but xii.1924.
- variegatus** (*Parapilinurgus*), 1910c : 204 [original series: 2]. Holotype ♂, BURMA: Karen Mts (*Doherty*).
Paratype. VIETNAM (NORTH): 1 ♀, Dong Van, 1898 (*Captain Gadel*) (MNHN, Paris).
- viduatus** (*Dasyvalgus*), 1910c : 236. Holotype ♀, BURMA.
- waterhousei** (*Macronota*), 1910c : 56. LECTOTYPE ♂, INDIA: Nilgiri Hills (*H. L. Andrewes*); here designated.
Paralectotypes. INDIA: 5 ♂, 8 ♀, same data as lectotype; 1 ♀, same data as lectotype, but (*G. F. Hampson*); 1 ♀, same data as lectotype, but no collector; 2 ♂, Nilgiris (*H. M. Lefroy*); 2 ♂, 2 ♀, Nilgiris, Naduvatum, 7000 ft, v.1904 (*W. Rowson*); 2 ♂, Nilgiris, Naduvatum, 7000 ft; 4 ♂, 1 ♀, Anamalai Hills; 1 ♀, 'India'.
- zulu** (*Scaptobius*), 1936c : 260. Holotype [impossible to determine sex without dissection], SOUTH AFRICA: Zulu, lives in ants' nests only, with the same species of ants as *Paussus cucullatus*.

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A REVISION OF
ATOPOPOMPILUS ARNOLD, WITH
A NOTE ON THE IDENTITY
OF *ANOPLINELLUS* BANKS
(HYMENOPTERA : POMPILIDAE)

M. C. DAY

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MICHAEL CHARLES DAY

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By M. C. DAY

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SYNOPSIS

Anoplinellus Banks, a genus based on a misidentified type-species, is disposed of as a synonym of *Arachnophroctonus* Howard. *Atopopompilus* Arnold is recalled from synonymy and redefined to include Ethiopian, Malagasy and Oriental species; the males of all species are recognized. Six species are revised and a seventh described as new; a key and distributional data are given. Lectotypes are designated for four nominal species, and type-material of a fifth is presumed lost; eleven new specific synonyms are established.

INTRODUCTION

VARIOUS groups of Pompilidae exhibit quite substantial sexual dimorphism, and this phenomenon has, on occasion, given rise to considerable taxonomic confusion. New taxa have been established for species or groups of species recognized only from one sex, the other remaining undescribed, or being assigned to other taxa. The genus here revised, *Atopopompilus* Arnold, 1937, is an example of such confusion, as will be clear from this introduction.

Haupt (1929), in his treatment of the genus *Paracyphononyx* Gribodo, 1884, included species of two distinct groups, as is shown by the immediate dichotomy in his keys to females and to males. Arnold (1936) revised the Ethiopian species of *Paracyphononyx*, including the males of both groups keyed by Haupt, but the females only of one group, those most closely related to *P. melanicrus* Gribodo,

1884, type-species of *Paracyphononyx*. In 1937, Arnold proposed *Atopopompilus* for the second group of females. However, males of one group which characteristically have a median carina on the face between and below the antennae, had been associated by Haupt with females of three species, *P. nefas* Dalla Torre, 1897, *P. coloratus* Haupt, 1929, and *P. venans* Kohl, 1894, the last being type-species of *Atopopompilus*. In his revision of *Paracyphononyx*, Arnold (1936) had recognized Haupt's carinate-faced male, *P. affinis* Haupt, 1929, and had placed Haupt's other carinate-faced species in the synonymy of *Pompilus carinatus* Radoszkowski, 1881. In 1937, Arnold stated 'male unknown' after his diagnosis of *Atopopompilus*.

Atopopompilus as here discussed includes five Ethiopian and one Malagasy species; a related species occurs in the Oriental and Indonesian regions. Banks (1934) proposed *Anoplinellus* as a genus for this Oriental species, known to him only from females which he misidentified as *Pompilus clotho* Smith, 1879. Van der Vecht (unpublished) correctly associated this female with its male in long series of specimens from Java, identified as the subsequently described *Anoplinellus javanus* Haupt, 1935. The males have a carinate face. A female and male, determined by Van der Vecht, are in the collections of the National Museum of Rhodesia as a result of exchanges between Arnold and Vecht. However, Arnold did not associate the female with *Atopopompilus*, or the male with 'carinate-faced *Paracyphononyx*'.

Haupt (1950) re-assessed *Atopopompilus* and gave a key to the females of the species he recognized. He again referred to a male of *A. venans*, in cursive text, but did not give sufficient information to enable other workers readily to identify it.

Evans (1966), in his revisional study of North and Central American Pompilinae, listed *Atopopompilus* as a synonym of *Paracyphononyx*, and suggested that *Atopopompilus* might ultimately be used as a subgenus within the latter genus. However, Evans based his knowledge of *Atopopompilus* only on female specimens; his diagnosis of *Paracyphononyx* does not include carinate-faced males. Neotropical species placed in *Atopopompilus* by Banks (1947) are here regarded as members of *Paracyphononyx*, following Evans (1966).

After study of reasonable series of specimens and their geographical distribution, and an antero-postero gynandromorph individual, the association of sexes originally made by Haupt can now be confirmed unreservedly. The carinate-faced males are here recognized as the true males of *Atopopompilus*. It is the purpose of this paper to revise the species of this Palaeotropical genus, here recalled from the synonymy of *Paracyphononyx*. The identity of *Anoplinellus* is examined, and the name disposed of as a synonym of the genus to which its type-species belongs.

I continue to follow the terminology of Evans (1966); abbreviations here employed are as follows:

- LID: lower interocular distance (distance between eyes below antennae)
- MID: middle interocular distance (distance between eyes across front)
- SMC: submarginal cell
- TFD: transfacial distance (width of head)
- UID: upper interocular distance (distance between eyes on vertex).

Depositories in which material studied is housed are as follows; abbreviations for these institutions used in the text are also here listed.

AM	Albany Museum, Grahamstown, Cape Province, Republic of South Africa.
BMNH	British Museum (Natural History), London.
IRSNB	Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium.
ISM	Institut Scientifique, Madagascar.
MB	Museu Bocage, Lisbon, Portugal.
MCZ	Museum of Comparative Zoology, Boston, U.S.A.
MHN	Muséum d'Histoire Naturelle, Geneva, Switzerland.
MNHN	Muséum National d'Histoire Naturelle, Paris, France.
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin, East Germany.
MRAC	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
NM	Naturhistorisches Museum, Basle, Switzerland.
NMR	National Museum of Rhodesia, Bulawayo, Rhodesia.
NR	Naturhistoriska Riksmuseum, Stockholm, Sweden.
TM	Transvaal Museum, Pretoria, Transvaal, Republic of South Africa.
UM	University Museum, Oxford, United Kingdom.
USNM	United States National Museum, Washington, U.S.A.
ZM	Phyletisches Museum, Halle an der Saale, East Germany.
coll. Wahis	Private collection of Monsieur R. Wahis, Chaudfontaine, Belgium.

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THE IDENTITY OF *ANOPLINELLUS* BANKS, AND ITS TYPE-SPECIES

Banks (1934) proposed *Anoplinellus* for females of a species of Pompilidae from the Philippines and Indonesia which he misidentified as *Pompilus clotho* Smith, 1879, which species is type by monotypy. Female specimens bearing Banks's labels have been examined, and are here identified as conspecific with *Pompilus daedalus* Bingham, 1896, a species here regarded as congeneric with *Pompilus venans* Kohl, 1894, type-species of *Atopopompilus* Arnold. The material consists of the following specimens: a female from Iligan, Mindanao (coll. Baker) in the USNM, bearing a label 'Anoplinellus clotho Sm.'; a female in MCZ from Sandakan, Borneo (coll. Baker) bearing a label 'Anoplius clotho Sm.'; and two females from Celebes (Sulawesi) (coll. C. F. Clagg). One of the Celebes females bears a Banks manuscript name in *Anoplinellus*; he referred to this undescribed material in 1934.

P. clotho Smith was described from a single female specimen. This holotype is in the BMNH, and agrees well with the description; it is a species of *Anoplius* Dufour. It bears a label in Smith's hand, 'Pompilus clotho type Sm.', and a second small white circular label has written on one side the figures '54. 76', and 'Sumatra' on the

reverse. The figures refer to an entry in the accessions register of BMNH dated 1854. The data recorded indicate that the specimen came to the museum as part of a collection disposed of by the Zoological Society of London through the London dealer, Stevens. This collection included material gathered from several sources; some from Sumatra, collected for Sir Stamford Raffles, and some from 'San Domingo' collected by Hearne; also material from Brazil, Colombia, 'Niger', Trebizond and Madagascar. The holotype of *P. clotho* is labelled as part of the material collected in Sumatra. However, I know of no other Oriental or Indonesian specimens similar to the holotype. The specimen, which has lost parts of some legs and an antenna, and has its pubescence much rubbed, nevertheless is immediately noteworthy in that it presents the characteristic facies of many Nearctic species of Pompilidae.

The type of *P. clotho* is in my opinion consubgeneric with the type-species of *Arachnophroctonus* Howard, a subgenus of *Anoplius*. The species of *Arachnophroctonus* known to me from the East Indies are markedly different in coloration, and readily separated morphologically, from *P. clotho*. In Evans's (1951; 1966) keys to species of North and Central American *Arachnophroctonus*, the specimen keys out as *A. relativus* Fox, 1893, recorded by Evans as a 'somewhat variable species'. The holotype of *P. clotho* (bearing in mind its poor condition) is closely similar to specimens of *A. relativus*.

Since other material in the collection obtained by the BMNH from Stevens came from San Domingo rather than Sumatra, there is a reasonable possibility that this type-specimen could have been collected in the West Indies or Central America. San Domingo is normally construed as referring to the present-day Dominican Republic. It is conceivable but unlikely that some other locality of this name on the Central American mainland was intended. H. E. Evans (personal communication) informs me that *A. relativus* is not yet known to occur in the West Indies. However, he has seen males of a closely related undescribed species from the Dominican Republic.

It would seem likely that the holotype could have been mislabelled 'Sumatra' when incorporated into the BMNH collections; certainly, the type-locality should be regarded as doubtful. However, three possibilities should be considered:

- (a) *P. clotho* may be an Indonesian species of *Anoplius*, known only from the type-specimen;
- (b) *P. clotho* may be a West Indian species of *Anoplius*;
- (c) *P. clotho* may be a senior synonym of *A. relativus*.

On the balance of present evidence, the second possibility seems most probable. It is not feasible here completely to resolve the problem since our knowledge of the pompilid faunas of East and West Indies is so imperfect.

Haupt (1935) described *Anoplinellus javanus* from two female specimens collected in Java. He recognized the genus *Anoplinellus* as described by Banks, and stated 'male unknown'. No authors have subsequently used the name *Anoplinellus*, save in a catalogue of the genera of Pompilidae (Pate, 1946).

Although proposed at a later date than *Anoplinellus*, *Atopopompilus* has enjoyed more frequent use (Arnold, 1937; 1951; Haupt, 1950; de Saeger, 1945) and has had

more nominal species referred to it. The type-species has always been correctly identified. In view of the more limited use of *Anoplinellus*, the misidentification of its type-species, and the doubt surrounding the provenance of the type-specimen of *P. clotho*, I propose to place *Anoplinellus* in the synonymy of *Arachnophroctonus*, with the type-species of which *P. clotho* is consubgeneric. The nomenclatural changes are formalized below.

Subgenus *Arachnophroctonus* Howard

Arachnophroctonus Howard, 1901: pl. 7, fig. 11. Type-species: *Sphex tropicus* Linnaeus sensu Fabricius, 1775 (misidentification) [= *Psammochares marginalis* Banks, 1910], by subsequent designation (Pate, 1946: 129).

Anoplinellus Banks, 1934: 84. Type-species: *Pompilus clotho* Smith, 1879, by monotypy.
Syn. n.

Anoplius (*Arachnophroctonus*) *clotho* (Smith) **comb. n.**

Pompilus clotho Smith, 1879: 146. Holotype ♀, provenance uncertain: labelled 'Sumatra', but more probably DOMINICAN REPUBLIC (BMNH) [examined].

Atopopompilus Arnold is thus the only available name for the genus here revised.

Genus *ATOPOPOMPILUS* Arnold **stat. rev.**

[*Anoplinellus* Banks, 1934: 84. Misidentification, see above]

Atopopompilus Arnold, 1937: 22. Type-species: *Pompilus venans* Kohl, 1894 [= *Pompilus carinatus* Radoszkowski, 1881], by original designation.

♀♂. Length 7–23 mm. Body colour black; females of some species with more or less red-brown coloration on head, thorax or legs, more rarely light red-brown; antennae sometimes red-brown to orange; palpi frequently light red-brown. Males as above, but frequently with a yellow line on posterior pronotal margin, often extensively yellow on face, dorsal surface of hind tibia, and often on tarsi and seventh tergite. Female wings infusate, darker at margin; male, hyaline with infusate margin or fusco-hyaline with darker margin. Both sexes with more or less grey or white pubescence on face, thorax, coxae and abdomen. Female with sparse, long, thin erect hairs on head, thorax, coxae and abdomen, each arising from a more or less distinct small pit; less noticeable on dorsum of thorax and abdomen. Male often less hirsute, but hairs frequently white, more noticeable. Female post-scutellum and propodeum often with numerous short thick, dark erect hairs also, which may appear thickened or adpressed, and sometimes reflect violaceous. Male post-scutellum and posterior half or third of propodeum with very dense, long, erect white pubescence, perpendicular to insertion or at an angle. Posterior tergite and sternites of female with more or less marked strong erect hairs.

Head thin in lateral view (Text-figs 1, 3), inserted low on thorax; vertex abrupt, not gently rounded; labrum exposed, semicircular or truncate; mandibles short, normally not exceeding opposite edge of labrum when closed, with a single tooth on inner margin. Malar space present, not exceeding half thickness of first flagellar segment. Female face with a small interantennal tubercle, sometimes with a faint trace of a carinate edge continuing just below the antennal insertions. Male face with a more or less strong facial carina, from middle of face passing between antennal insertions, normally to reach clypeus, where it may divide in two and become lost (Text-figs 29–34). Female antennae normally elongate, thin, but rarely with shorter, thicker antennae. Male antennae strongly crenulate. Occiput concave transversely, vertex well defined, never carinate. Temples almost obsolete. Thorax relatively massive, pronotum narrowed in front, short, with more or less arcuate posterior margin. Postnotum short, very

slightly expanded on either side of the median line. Female propodaeum frequently with more or less well defined sloping posterior declivity, sometimes flattened also on lateral corners; rarely, propodaeum rounded. Declivity occasionally concave, sometimes with very fine aciculae centrally; one species with distinct tubercles produced laterally. Male propodaeum usually with low lateral profile, rounded. Legs elongate, strongly spinose, but female without tarsal comb; foremetatarsus with two short lateral spines in addition to terminal spine. Ultimate tarsal segments lack spines beneath, claws strongly bifid, with a broad, truncate rear tooth. Apical segment of male foretarsus unmodified with claws asymmetric, inner claw more curved, tooth stout and blunt. Female abdomen somewhat compressed apically, last sternite strongly so with well-marked blunt, polished ventral carina at least terminally. Forewings with SMC₂ approximately equal to SMC₃, latter often narrowed above. Radial vein beyond SMC's with characteristic curve (Text-fig. 9). Male genitalia with basal hooklets single. Parameres only just exceeding other appendages, very thin, with more or less long hairs. Subgenital plate with more or less triangular termination, sometimes truncate at tip, hairy but without thick spines or long hairs on posterior margin (Text-fig. 23).

Females may readily be recognized by the combination of bifid claws, malar space, and the compressed posterior abdominal segments with a short ventral carina terminally. The general habitus, especially the high, broad thorax and thin head, render the genus particularly recognizable. The males, with the conspicuous facial carina and crenulate antennae, can be confused only with *Batozonellus* Arnold or *Paracyphononyx* in the Old World. The former may be recognized by the characteristic venation, broad face, and arcuate expansion of the postnotum either side of the midline. Males of the latter genus lack the carinate face.

DISTRIBUTION. Forest, woodland and savanna areas of the Old World tropics including Ethiopian and Malagasy, Oriental and Indonesian regions.

BIOLOGY. Unknown. Morphology indicates a non-fossorial habit. This genus may utilize pre-existing nest-cavities, or leave prey in situ at site of attack.

INCLUDED SPECIES. Five Ethiopian, one Malagasy, and one Oriental species are here regarded as members of *Atopopompilus*. The Ethiopian species form a more closeknit group, the two remaining species being each somewhat distinctive; however, I do not feel that any infrageneric grouping is necessary.

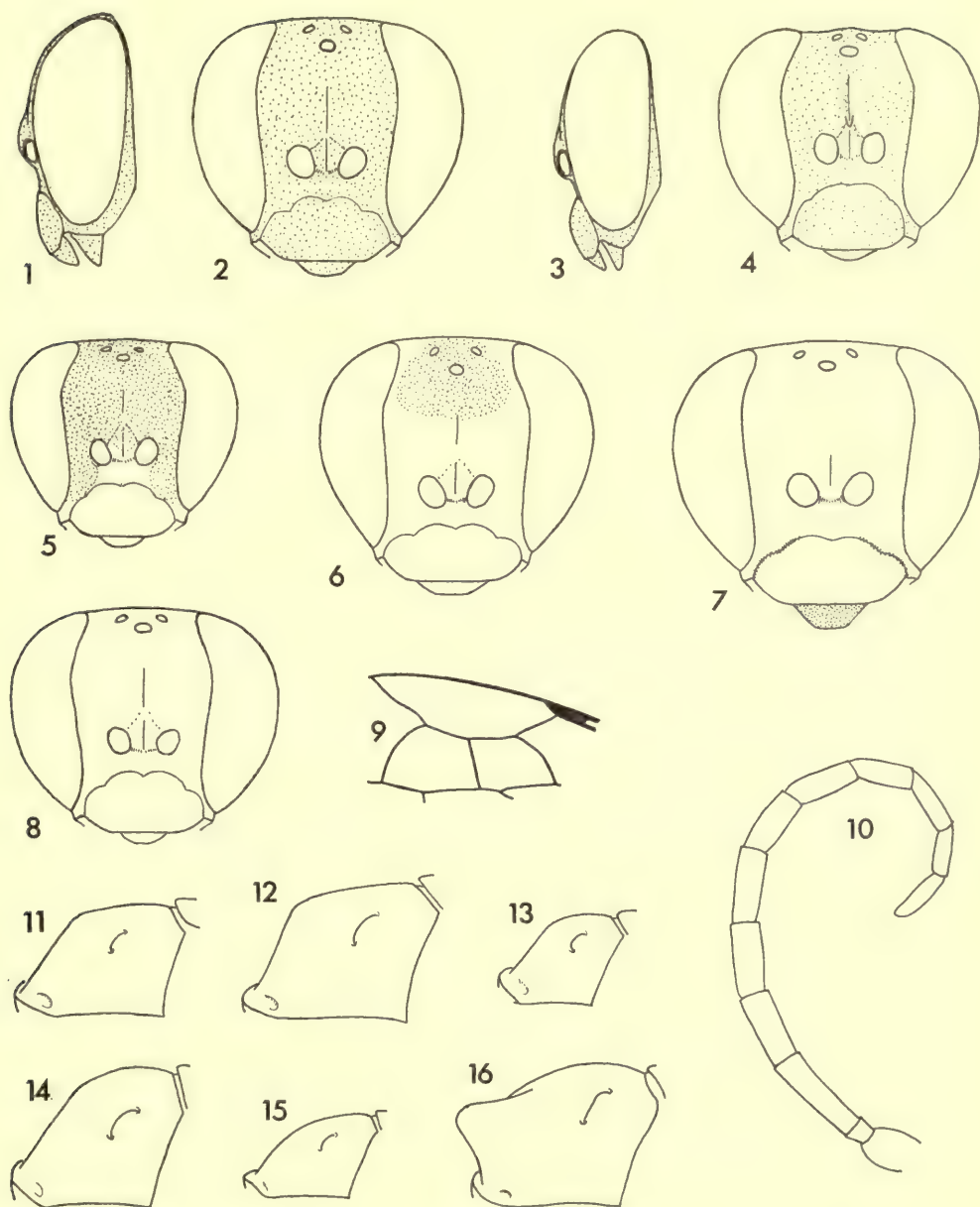
Although *Atopopompilus* has much in common with *Paracyphononyx*, it is a very distinctive and comparatively homogeneous group of species. It is not possible at this stage to state with any certainty whether the similarities of the two genera are due to convergence or to close relationship. It seems most convenient, in the absence of biological information, to regard *Atopopompilus* as a genus perhaps standing in a similar relationship to *Paracyphononyx* as does *Batozonellus* to *Episyron* Schiödt. Its status may better be reassessed when the more diverse and widespread *Paracyphononyx* has been adequately revised.

KEY TO THE SPECIES OF *ATOPOPOMPILUS*

FEMALES

- 1 Propodaeum with well-developed lateral tubercles (Text-fig. 16). Black, with more or less red-brown anteriorly, on head and thorax. Madagascar.

nefas (Dalla Torre) (p. 63)



FIGS 1-16. 1-8. Female head: 1. *A. carinatus*, side view. 2. Facial view. 3. *A. daedalus*, side view. 4. Facial view. 5-8. Facial views. 5. *A. nasutus*. 6. *A. kilimandjaroensis*. 7. *A. nefas*. 8. *A. jacens*. 9. Submarginal cells of forewing, *A. carinatus*, female. 10. Female antenna, *A. crassicornis*. 11-16: Female propodeum, lateral profile. 11. *A. carinatus*. 12. *A. kilimandjaroensis*. 13. *A. jacens*. 14. *A. daedalus*. 15. *A. nasutus*. 16. *A. nefas*.

- Propodaeum without lateral tubercles. If with red-brown head and prothorax, then antennae also so coloured 2
- 2 Head short, broad, flat in the face (Text-figs 3, 4). Oriental region
daedalus (Bingham) (p. 66)
- Head less short, face more convex (Text-figs 1, 2, 5, 6, 8). Ethiopian region 3
- 3 Unicolorous black, or black with very dark brown appendages; often with a little red-brown ventrally on antennae 4
- Black with antennae substantially red-brown or orange, sometimes legs and/or head and prothorax red-brown 5
- 4 Second and subsequent few flagellar segments at least $4.0 \times$ as long as wide.
carinatus (Radoszkowski) (p. 54)
- Second and subsequent few flagellar segments not more than $3.0 \times$ as long as wide (Text-fig. 10) *crassicornis* sp. n. (p. 57)
- 5 Prothorax red-brown or yellow-brown *jacens* (Bingham) (p. 61)
- Prothorax black 6
- 6 Antennae orange, sometimes darker basally; face almost maroon, area about ocelli black (Text-fig. 6). Propodaeum massive, with marked declivity (Text-fig. 12)
kilimandjaroensis (Cameron) (p. 59)
- Antennae and legs, clypeus and lower part of face red- or orange-brown (Text-fig. 5). Propodaeum rounded (Text-fig. 5) *nasutus* (Haupt) (p. 58)

MALES

- 1 Propodaeum excised behind; wings lightly infusate, head and anterior part of thorax red-brown, otherwise black. Madagascar *nefas* (Dalla Torre) (p. 63)
- Propodaeum not excised behind: wings fusco-hyaline, or hyaline with infusate outer margins. Body black, with some yellow colour; if with red-brown on thorax, then legs or antennae so coloured. Oriental and Ethiopian regions 2
- 2 Wings fuscohyaline with tips infusate, body colour black with some yellow on face, prothorax, hind tibiae and seventh tergite 3
- Wings fuscohyaline, or hyaline with infusate tips. Body colour black and yellow, also with some red-brown at least on appendages, often also on head and thorax 5
- 3 Facial carina not distinct on clypeus (Text-figs 29, 30). Oriental region. Antennae as in Text-fig. 24. *daedalus* (Bingham) (p. 66)
- Facial carina distinct on clypeus, forked to give two lateral arms (Text-figs 31-33). Ethiopian region 4
- 4 Antennal crenulations angulate ventrally in profile (Text-fig. 25)
carinatus (Radoszkowski) (p. 54)
- Antennal crenulations curved ventrally in profile (Text-fig. 27) *crassicornis* sp. n. (p. 57)
- 5 Antennal crenulations angulate ventrally (Text-figs 25, 28) 6
- Antennal crenulations curved ventrally (Text-fig. 27) *kilimandjaroensis* (Cameron) (p. 59)
- 6 Forewing hyaline with infusate tip; antennae shorter, stouter, with less curvature dorsally on each segment (Text-fig. 28) *jacens* (Bingham) (p. 61)
- Forewing fuscohyaline with infusate tip; antennae more elongate, with more distinct segmental curvature dorsally (Text-fig. 25) *nasutus* (Haupt) (p. 58)

Atopopompilus carinatus (Radoszkowski) comb. n.

(Text-figs I, 2, 9, II, I7, 23, 25, 3I, 32)

Pompilus carinatus Radoszkowski, 1881 : 212. Holotype ♂, ANGOLA (MB, Lisbon) [examined].

Pompilus venans Kohl, 1894 : 315. Holotype ♀, SIERRA LEONE (TM, Pretoria) [examined].

Syn. n.

Paracyphononyx venans (Kohl) Haupt, 1929 : 168; ♀, ♂.

Paracyphononyx affinis Haupt, 1929 : 170. Holotype ♂, CAMEROUN (MNHU, Berlin) [examined]. **Syn. n.**

Paracyphononyx affinis Haupt; Arnold, 1936 : 445; ♂.

Atopopompilus venans (Kohl) Arnold, 1937 : 23; ♀.

Atopopompilus venans (Kohl); Haupt, 1950 : 57; ♀, ♂.

♀. Length 13–21 mm. Black; legs and antennae sometimes very dark brown; sensory areas of antennae often red-brown. Face below antennae with some silvery pubescence, otherwise pubescence more commonly brownish. Hairs of head and thorax relatively long (often as long as thickness of scape), dense, often lost in worn specimens.

Antennae most usually elongate, but occasionally less so (second flagellar segment only $4 \times$ as long as thick). Front narrow, high (Text-fig. 2), proportions variable. Inner orbits converge strongly above, converging or sub-parallel below. Thorax of form described for genus, propodeum with a pronounced declivity which frequently has a central area of very fine aciculae; with long erect hairs and adpressed short hairs. SMC₃ narrowed above, shorter on radial vein than is SMC₂.

♂. Length 7–15 mm. Black; border of inner orbits, tip of facial carina, lateral area of clypeus, posterior pronotal margin, area on dorsal surface of hind tibia, yellow. At least some reddish ventrally on basal antennal segments, some populations with much of antennae, labrum, tip of clypeus, and part of legs dark or light red-brown. Wings fusco-hyaline with darker margins. Body extensively silvery pubescent, with much erect silvery hair, particularly on posterior third of propodeum, less on anterior half of first tergite. Seventh tergite with a small amount of whitish yellow colour in dark specimens, more extensively so in specimens with some red-brown coloration.

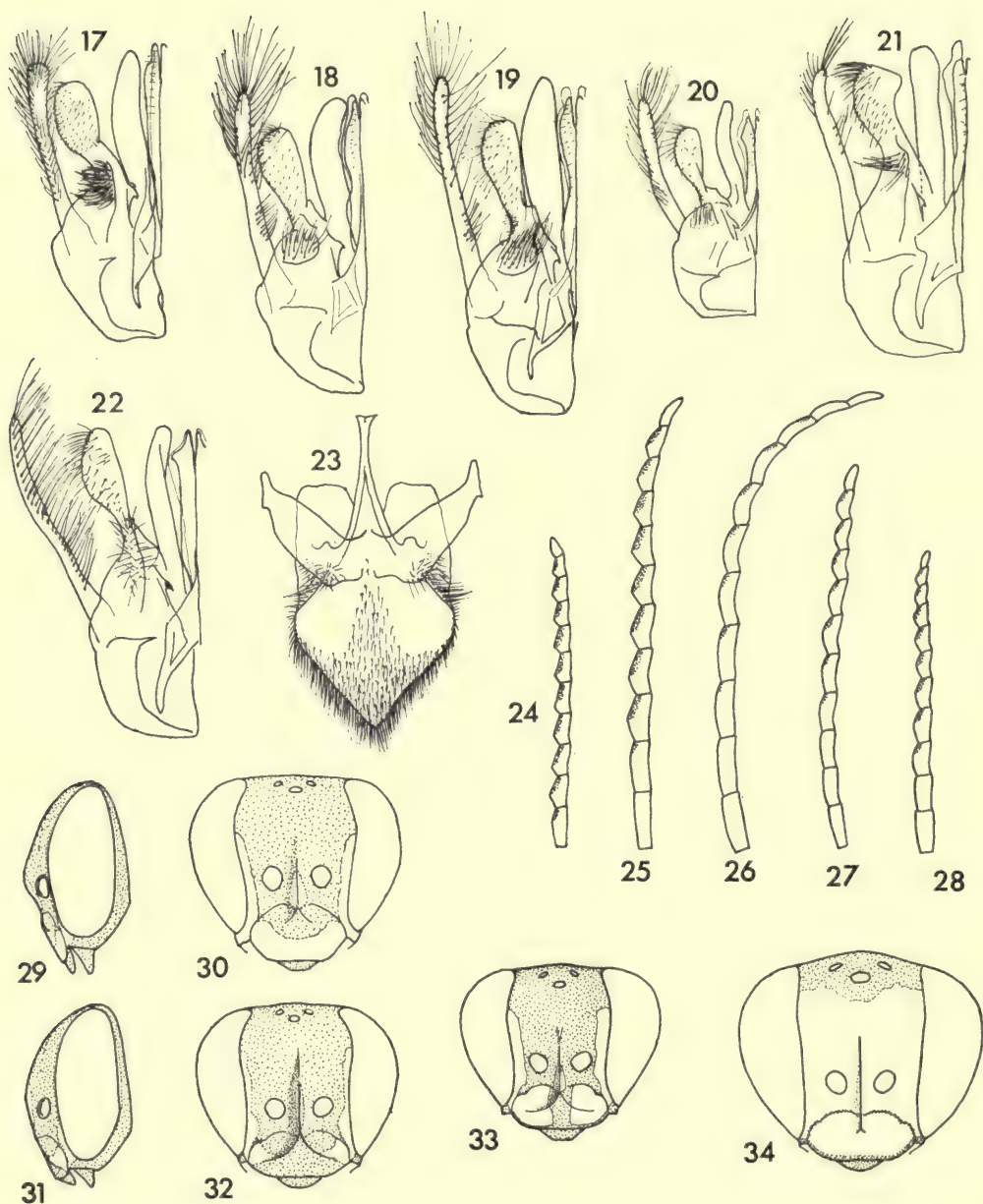
Antennae (Text-fig. 25) markedly crenulate, each segment with a sharp ventral angle when viewed in profile. Face with well marked carina extending onto clypeus. Inner orbit of eyes converging above, sub-parallel, then diverging below (Text-fig. 32). Genitalia as in Text-fig. 17.

The holotype of *P. carinatus* stands under that name in the collections of MB, Lisbon. It is in fair condition but bears no original labels. Radoszkowski's description, though brief, is unmistakeable and applies well to the type-specimen. However, Arnold applied the name to *A. jacens* (p. 61), despite the fact that the description of *P. carinatus* does not mention any red coloration.

Haupt associated a male from Bonjongo with *P. venans*. This specimen, in the collections of MNHU, Berlin, bears Haupt's determination label and a 'type' label (i.e. so-called 'allotype' of *P. venans* Kohl). It has no such status. It is clearly conspecific with the type of *P. affinis*, though the yellow coloration of the former specimen is much reduced. It was on a basis of this colour difference that Haupt separated the two in couplet 12 of his key to males (1929). The confusion amongst the African species arises mainly from this inadequate key, and from Arnold's consequent misidentifications.

DISTRIBUTION. The species is characteristic of the dense humid forest regions of Central and West Africa; summarized on Map 1, p. 60.

VARIATION. The antennae of females show much variation in length relative to thickness. This correlates broadly with the relative proportions of the thorax and legs, in that females with shorter, thicker antennae tend to have shorter, thicker legs and a more massive thorax. The face of a female with attenuate antennae is



FIGS 17-34. 17-22. Male genitalia, left half, ventral view. 17. *A. carinatus*. 18. *A. nasutus*. 19. *A. kilimandjaroensis*. 20. *A. jacens*. 21. *A. nefas*. 22. *A. daedalus*. 23. Subgenital plate, *A. carinatus*, male. 24-28. Male antennal flagellum, i.e. excluding scape and pedicel. 24. *A. daedalus*. 25. *A. carinatus*. 26. *A. nefas*. 27. *A. kilimandjaroensis*. 28. *A. jacens*. 29-34. Male head. 29. *A. daedalus*, side view. 30. Facial view. 31. *A. carinatus*, side view. 32. Facial view. 33-34. Facial views. 33. *A. crassicornis*. 34. *A. nefas*.

illustrated in Text-fig. 2; females of the more compact structure tend to have a slightly broader face; it is difficult to segregate these females from those of *A. crassicornis* sp. n. (see below). Males in West Africa have a tendency towards the development of red-brown coloration on antennae and legs.

MATERIAL EXAMINED.

Pompilus carinatus Radoszkowski, holotype ♂, ANGOLA: no further data (Welwitsch) (MB, Lisbon). *Pompilus venans* Kohl, holotype ♀, SIERRA LEONE: 25.viii.1892 (H. Brauns) (TM, Pretoria). *Paracyphononyx affinis* Haupt, holotype ♂, CAMEROUN: 'Joh. Albrechtshohe' (Conradt) (MNHU, Berlin).

ANGOLA: Salazar, field station of I.I.A.A., on path through dense humid forest, 9-15.iii.1972, 2 ♀ (*D. Hollis*); same, in Malaise trap, 1 ♂; 7 miles west of Gabela, in coffee plantation, swept from vegetation beside path, 17.iii.1972, 1 ♂ (*M. C. Day*) (BMNH Southern African Expedition, 1972) (BMNH). CAMEROUN: Lolodorf, 2 ♀ (Conradt); Bonjongo, 17.iv.1873, 1 ♂ (so-called 'allotype' of *P. venans*); Victoria, on flowers of *Bidens pilosus*, 5.vii.1890, 1 ♀ (*Preuss*) (MNHU); R. Dja, 3°15' N., 13°30' E., v-vii.1936, 1 ♀ (*F. G. Merfield*) (BMNH). DAHOMEY: no further data, 1903, 1 ♀ (*E. Poisson*) (MNH). GABON: Mts de Cristal, 15-31.x.1969, 1 ♀ (*A. Villiers*) (MNH). GHANA: Ashanti, Obuasi, 1908, 1 ♀ (*W. M. Graham*); Aburi, 1400', xii. 1941, 1 ♂ (*K. M. Guichard*) (BMNH). NIGERIA: Olokemeji, near Ibadan, 1 ♂ (*Bridwell*) (USNM); Ibadan, 4.vii.1922, 1 ♂ (*A. W. J. Pomeroy*) (BMNH). SIERRA LEONE: Njala, x. 1935, 1 ♀ (*E. Hargreaves*) (BMNH). TOGO: Bismarck Mts, 1890, 1 ♀ (*Buttner*) (MNHU). UGANDA: Mabira Forest, Chagwe, 3500'-3800', 16-25.vii.1911, 1 ♀; W. shores of Lake Victoria, Buddu, 3700', 19-25.ix.1911, 1 ♀; Entebbe, 1-11.xi.1911, 2 ♀ (*S. A. Neave*); Mabira Forest, 3.vii.1913, 1 ♀ (*C. C. Gowdey*) (BMNH). RWANDA: Bukavu (Costermansville), 1939, 1 ♀, 1 ♂ (*Hautmann*); 1948, 1 ♂ (*P. H. Vercammen*); Muhavura, 2100 m, 28.i.1953, 1 ♂ (*P. Basilewsky*) (MRAC). ZAIRE: Kibali-Ituri, Epulu, x. 1956, 1 ♀ (*M. Poll*); Kivu, Kavumu, 1951, 1 ♀ (*H. Bomans*); Paulis, viii. 1947, 1 ♀ (*P. L. G. Benoit*); Bambesa, 20.ix.1933, 1 ♀ (*H. J. Bredo*); 20.x.1933, 1 ♀ (*J. Leroy*); viii-xii. 1937, 4 ♀ (*J. Vrydagh*); v. 1938, 3 ♀ (*P. Henrard*) (MRAC); Bambesa, 11.ix.1937, 1 ♀ (*J. Vrydagh*) (IRSNB); Bambesa, 25.ix.1933, 1 ♀ (*H. J. Bredo*); Ubangi, Duma, 10.x.1910, 1 ♀ (*H. Schubotz*) (MNHU); Bumba, 1940, 1 ♀ (*H. de Saeger*) (MRAC); Coquilatville, 10.vii.1936, 1 ♀ (*R. P. Hulstaert*) (MNH); Eala, xi. 1935, 1 ♂ (*J. Ghesquière*); Tshuapa, Bamanya, xi. 1964, 1 ♀ (*R. P. Hulstaert*); Sankuru, Komi, ii. 1930, 1 ♂ (*J. Ghesquière*) (MRAC); Lualaba River, 5.v.1907, 1 ♀ (*S. A. Neave*) (BMNH); Luluabourg, 1 ♀ (MHN); Kasai, Kondue, 1 ♀ (*E. Luja*); Kasongo, ix. 1959, 1 ♀ (*P. L. G. Benoit*); Mutsors?, 1939, 1 ♀ (*Hackars*) (MRAC).

Atopopompilus crassicornis sp. n.

(Text-figs 10, 27, 33)

♀. Length 11-14 mm. Black; morphologically very close to *A. carinatus*, but of more compact structure. Face wider, thorax stouter, less hirsute, legs and antennae shorter, thicker

(antenna as in Text-fig. 10). Antennal segments tend towards oval section, second flagellar segment not more than $3 \times$ as long as greatest width.

♂. Length 11 mm. Black with yellow maculation on face and prothorax; morphologically close to *A. carinatus*. Head broad, less high than in *A. carinatus* (Text-fig. 33). Antennal segments curved beneath in profile, ventral sensory areas as those of *A. kilimandjaroensis* (Text-fig. 27). However, dimensions of segments more nearly those of *A. carinatus* (Text-fig. 25).

Two females of this species from Uganda were collected together with typical females of *A. carinatus*, and as a matter of direct comparison are clearly distinct both in the more compact form of the thorax, and the short, thick antennae. However, females from other parts of the range of *A. carinatus* tend to bridge the gap between the extremes represented by these Ugandan females. On the basis of female structure alone, I would hesitate to describe this taxon. However, certain characters that I believe are those of the male are exhibited by a gynandromorph specimen, of which all save the abdomen is male. I am confident that the structure of the antennae and head are typical of the species it represents, and not modified as a result of its mosaic genotype. The shape of the head, together with the curved antennal crenulations and general coloration separate this specimen from all other males I have seen. In particular, I have found antennal structure to give reliable identification of males in this genus, and the nature of the antennal differences observed in this specimen relative to the male of *A. carinatus* is entirely consistent with the sorts of differences observed between other species. Geographical distribution further supports the association of this gynandromorph with the females here described.

DISTRIBUTION. East Africa; highland and lake area of the Great Rift Valley in Uganda and Eastern Zaire: summarized on Map 1, p. 60.

MATERIAL EXAMINED.

Holotype ♀, UGANDA: Entebbe, 1-11.ix.1911 (*S. A. Neave*) (BMNH).

Paratypes. UGANDA: west shores of Lake Victoria, Buddu, 3700', 19-25.ix.1911, 1 ♀ (*S. A. Neave*) (BMNH). ZAIRE: Mt Hoyo, Ituri, 1250 m, 5.x.1957, gynandromorph (*E. S. Ross & R. E. Leach*) (coll. Wahis); Kibali-Ituri, Kilo, Mongbwalu, 1937, 1 ♀ (*Harford-Jordens*); Kilo, Mines, 1955, 1 ♀ (*R. Andry*) (MRAC).

Atopopompilus nasutus (Haupt) comb. n.

(Text-figs 5, 15, 18, 25)

Paracyphononyx nasutus Haupt, 1929 : 170. Holotype ♂, TANZANIA (MNHU, Berlin) [examined].

[*Atopopompilus venans* (Kohl) sensu Arnold, 1937 : 24. ♀ colour variety. Misidentification.]

Atopopompilus bruneipes Haupt, 1950 : 57. Holotype ♀, ZAIRE (MRAC, Tervuren) [examined].

Syn. n.

♀. Length 12-17 mm. Black; face below antennal insertions, clypeus, labrum, mandibles, antennae, tibiae and tarsi orange-brown; sometimes also part or all of femora. Face below and beside antennae with silvery pubescence, otherwise pubescence mostly brownish. Hairs of head relatively long and dense as in *A. carinatus*.

Antennae elongate. Inner orbits converging above, less strongly so below. SMC₃ narrowed above, half as long on radial vein as is SMC₂. Propodaeum sloping gently (Text-fig. 15), rounded in profile, with incipient adpressed hairs or very short fine erect hairs projecting backwards, not vertical. Face as in Text-fig. 5.

♂. Length 8–12 mm. Black; clypeus, ventral surface of proximal antennal segments, tibiae and tarsi red-brown; femora sometimes also so. Border of inner orbits, part of clypeus, posterior pronotal margin, and dorsal surface of hind tibia, yellow. Seventh tergite whitish yellow. Wings fusco-hyaline with darker margins. Otherwise morphologically very close to *A. carinatus*. Genitalia as in Text-fig. 18.

Arnold placed *P. nasutus* in the synonymy of *P. carinatus*, by which name he misidentified *A. jacens*.

I have seen only two males, only one of which has part of its antennae. The proximal six segments are similar in form to those of *A. carinatus* (Text-fig. 25).

DISTRIBUTION. East Africa; summarized on Map 1, p. 60.

MATERIAL EXAMINED.

Paracyphononyx nasutus Haupt, holotype ♂, TANZANIA: Usambara, Nguela, (Rolle) (MNHU, Berlin). *Atopopompilus bruneipes* Haupt, holotype ♀, ZAIRE: Parc National Albert, Rutshuru, 10–24.vi.1934 (G. F. de Witte) (MRAC, Tervuren).

UGANDA: Entebbe, viii.1911, 3 ♀ (C. C. Gowdey); Entebbe, i–ii.ix.1911, 1 ♀ (S. A. Neave); Kampala, 19–28.xii.1915, 1 ♀ (C. C. Gowdey); Tero Forest, S.E. of Buddu, 3800', 26–30.ix.1911, 1 ♀ (S. A. Neave); Mubendi, 4.v.1911, 1 ♀ (C. C. Gowdey); 1918, no further data, 1 ♀ (C. C. Gowdey) (BMNH). ZAIRE: Rutshuru, xi. 1937, 1 ♂ (J. Ghesquière) (MRAC).

Atopopompilus kilimandjaroensis (Cameron) comb. n.

(Text-figs 6, 12, 19, 27)

Pompilus kilimandjaroensis Cameron, 1910 : 252. Holotype ♀, TANZANIA (NR, Stockholm) [examined].

Paracyphononyx personatus Haupt, 1929 : 170. Holotype ♂, TANZANIA (MNHU, Berlin) [examined]. **Syn. n.**

[*Paracyphononyx parallelus* Haupt sensu Arnold, 1936 : 445; ♀. Misidentification.]

Atopopompilus venans race *mlanjiensis* Arnold, 1937 : 24. Holotype ♀, MALAWI (BMNH) [examined]. **Syn. n.**

♀. Length 14–23 mm. Black; antennae, often including scapes, yellow-orange to orange-brown. Head capsule dark red-brown, almost maroon; with varying amounts of black on face, normally at least a horizontal band through anterior ocellus, sometimes reaching down to antennal insertions and back to vertex. Pubescence mostly brownish. Erect hairs of head and thorax shorter than in *A. carinatus* (mesopleural hairs shorter than thickness of second flagellar segment).

Antennal segments long, more than 4 × as long as wide. Inner orbits converging above, less strongly so below (Text-fig. 6). SMC₃ narrowed above, usually shorter on radial vein than is SMC₂. Propodaeum (Text-fig. 12) with abrupt and steep declivity, and posterior corners also flattened at 45 degrees. Erect hairs long (almost thickness of scape), adpressed hair dense and extensive.

♂. Length 9–12 mm. Black; mouthparts and clypeus, antennae and legs substantially red-brown; part of clypeus, facial carina, borders of inner orbits, temples, posterior pronotal

margin, spots on forelegs and dorsal surface of hind tibia, yellow. Last tergite white. Wings hyaline with infuscate margins. Body hair extensive, silvery, pubescence silver or grey. Propodaeum, save spiracular area, with extensive, dense silvery erect hair.

Morphologically very similar to *A. carinatus*, but antennal segments in lateral view rounded beneath (Text-fig. 27). Genitalia as in Text-fig. 19.

Arnold placed *P. personatus* in the synonymy of his *P. carinatus* (*A. jacens*). He also misidentified a female as *P. parallelus*, whilst excluding *P. venans* from *Paracyphononyx*.



MAP I. Distribution of *Atopopompilus* species in the Ethiopian and Malagasy regions.

DISTRIBUTION. Through much of the woodland and savanna areas of Africa; summarized on Map 1, p. 60.

VARIATION. Two females, from Bambesa and Moto, have a colour pattern very similar to that of *A. nasutus* females. The form of the propodaeum, however, is that of *A. kilimandjaroensis*. The colour pattern of the face of West African populations is more extensively dark, closely similar to that of *A. nasutus*.

I have seen only three males of this species.

MATERIAL EXAMINED.

Pompilus kilimandjaroensis Cameron, holotype ♀, TANZANIA: Kilimandjaro, Kibonoto, 1300–1900 m, 11.v.1906 (*Sjostedt*) (NR, Stockholm). *Paracyphononyx personatus* Haupt, holotype ♂, TANZANIA: Langenberg, v. 1898 (*Fulleborn*) (MNHU, Berlin). *Atopopompilus venans mlanjiensis* Arnold, holotype ♀, MALAWI: Mlange, 6.i.1913 (*S. A. Neave*) (BMNH).

ANGOLA: no further data, 1 ♂ (*Welwitsch*) (BMNH). GHANA: Accra, 13.vii.1941, 1 ♀ (*K. M. Guichard*); Tafo, 28.x.1970, 1 ♀ (*B. Bolton*) (BMNH). IVORY COAST: Assinie, 1886, 1 ♀ (*C. Alluaud*) (coll. Wahis). KENYA: Kwali Forest, 20 miles west of Mombasa, 1.iv.1948, 1 ♀ (*M. Steele*) (BMNH). MALAWI: Mt Mlange, xi. 1912–xi. 1913, 24 ♀, 1 ♂; near mouth of Lusangazi river, 1–3.ix.1910, 1 ♀; valley of N. Rukuru, Karonga district, 2000–4000', 15–18.vii. 1910, 1 ♀ (*S. A. Neave*) (BMNH); Mlanje, 2000', 20.i.1945, 1 ♀ (NMR). MOZAMBIQUE: foothills N. of Mt Chipirone, 19.xi.1913, 2 ♀; Kola valley E. of Mt Chipirone, 21.xi.1913, 2 ♀ (*S. A. Neave*) (BMNH). SIERRA LEONE: no further data, 1 ♀ (BMNH). TANZANIA: Langenberg, 20.viii–1.ix.1898, 1 ♀ (*Fulleborn*) (MNHU). ZAIRE: Moto, 1922, 1 ♀ (*L. Burgeon*); Bambesa, 10.iv.1937, 1 ♀ (*J. Vrydagh*); Sankuru, M'Pemba Zeo, 13.xii.1959, 1 ♀ (*D. R. Marechal*); Kabinda, 1935, 1 ♀ (*P. Henrard*); Lulua, Kapanga, x. 1932, 1 ♀ (*F. G. Overlaet*); Katanga, Lubombo, ix. 1928, 1 ♀ (*C. Seydel*); Kasongo, ix. 1959, 1 ♀ (*P. L. G. Benoit*) (MRAC); Elizabethville, iv. 1935, 1 ♀ (*F. de Loose*) (NMR).

Atopopompilus jacens (Bingham) **comb. n.**

(Text-figs 8, 13, 20, 28)

Pompilus jacens Bingham, 1912 : 560. Holotype ♂ (not ♀ as originally stated), RHODESIA (UM, Oxford) [examined].

Paracyphononyx parallelus Haupt, 1929 : 168. Holotype ♀, SOUTH AFRICA (MNHU, Berlin) [examined]. **Syn. n.**

Paracyphononyx coloratus Haupt, 1929 : 168. LECTOTYPE ♂, CAMEROUN (MNHU, Berlin), here designated [examined]. **Syn. n.**

[*Paracyphononyx carinatus* (Radoszkowski) sensu Arnold, 1936 : 443; ♂. Misidentification.]

Atopopompilus marshalli Arnold, 1937 : 24. Holotype ♀, RHODESIA (TM, Pretoria) [examined].

Syn. n.

Atopopompilus parallelus (Haupt) Haupt, 1950 : 58; ♀.

Atopopompilus coloratus (Haupt) Haupt, 1950 : 58; ♀.

LECTOTYPE DESIGNATION. *Paracyphononyx coloratus* Haupt. This species was described in the couplets of keys to females and males of species of *Paracyphononyx*.

A female and a male in the collections of the MNHU, Berlin bear Haupt's determination labels 'Paracyphononyx coloratus Haupt det. Haupt 1928'. Neither bears any form of 'type' label. The female is labelled 'Kamerun' and agrees with the short description. The male agrees with the short description, and with fig. 41 in the text of Haupt's paper, showing the head in facial view. A putative second male specimen is indicated by the citation of a range of measurements of body length (10–11 mm.). Records of MNHU indicate that a 'type' specimen of *P. coloratus* should be deposited in the collections, but Dr Königsmann of that institution is unable to trace other material. I am satisfied that the female and male I have seen were before Haupt when he described this species; since a male has been figured, I have labelled, and here designate as lectotype, the male specimen. Should a further male specimen of this species come to light, bearing Haupt's determination label, it should be treated as a paralectotype of *P. coloratus*.

♀. Length 9–17 mm. Black; antennae, head, part or all of pronotum, mesonotum, scutellum, tibiae and tarsi, sometimes also parts of femora, yellow-brown to red-brown, quite variable; occasionally (northern populations) face and pronotum substantially yellow. Erect hairs often quite long, intermediate between *A. carinatus* and *A. kilimandjaroensis*. Pubescence mostly brownish, occasionally silvery on face.

Antennal segments long, at least $4 \times$ as long as wide. Head short, broad, inner orbits converging above and below (Text-fig. 8). SMC₃ narrowed above, normally half as long on radial vein as is SMC₂. Propodaeum declivous but not abruptly so, posterior corners flattened but not strongly so (Text-fig. 13); short erect hairs of propodaeum not markedly adpressed, but backwardly directed.

♂. Length 8–12 mm. Black; with more or less red-brown coloration on head, pronotum, mesonotum, scutellum, and coxae; antennae and legs always so. Always with some yellow coloration behind eyes on temples, posterior pronotal margin, and on dorsal surface of hind tibia. Yellow may replace red-brown extensively on face and clypeus, pronotum, fore legs and tarsi. Wings largely hyaline with infusate margins. Pubescence extensive, silvery, also much erect silvery hair; propodaeum, save spiracular area, largely so covered. Seventh tergite white.

Antennae (Text-fig. 28) short, stout, each segment with sharp ventral angle when viewed in profile. Face with well-marked carina extending onto clypeus. Eyes convergent above and below, but UID clearly exceeds LID. Genitalia as in Text-fig. 20.

All the new taxa described in Bingham's posthumously published paper (1912) were designated 'form n.'. *A. jacens* has thus on occasion been recorded as '*P. festivus* f. '*jacens*', since *P. festivus* Klug was the immediately preceding species dealt with by Bingham. Arnold erroneously determined *A. jacens* as *P. carinatus*, and recorded *P. jacens*, *P. nasutus* and *P. personatus* as synonyms. The types of *P. jacens* and *A. marshalli* are both part of a series of specimens collected by G. A. K. Marshall in Salisbury and dispersed to Oxford, Bulawayo and London.

DISTRIBUTION. Widely distributed through parts of the woodland and savanna regions of Africa; summarized on Map 1, p. 60.

VARIATION. Males from southern Africa exhibit least red and yellow coloration on head and thorax. The extent of areas so coloured increases clinally in a northwards direction; thus, males from Cameroun and Nigeria are most extensively marked with red and yellow. Females from the most northern part of the range (Sudan, Cameroun, Nigeria) also have a tendency towards replacement of red-brown

by yellowish colour, particularly on the head and pronotum. The type-material of *P. coloratus* is of this extreme colour form.

MATERIAL EXAMINED.

Pompilus jacens Bingham, holotype ♂, RHODESIA: Salisbury, x.1899 (G. A. K. Marshall) (UM, Oxford). *Paracyphononyx parallelus* Haupt, holotype ♀, SOUTH AFRICA: Natal, no further data (MNHU, Berlin). *Paracyphononyx coloratus* Haupt, lectotype ♂, CAMEROUN: Bosum, 21-31.v.1914 (Tessmann) (MNHU, Berlin). *Atopopompilus marshalli* Arnold, holotype ♀, RHODESIA: Salisbury, iv. 1900 (G. A. K. Marshall) (TM, Pretoria).

CAMEROUN: Bosum, 1-10.vi.1914, 1 ♀ (Tessmann); ? Odessi, 5.v.1904, 1 ♀ (paralectotype of *P. coloratus*) (MNHU). KENYA: Mombasa Island, xi. 1911-iii. 1912, 1 ♀ (paratype of *A. marshalli*); Rabai, viii. 1930, 9 ♂; viii. 1937, 1 ♂ (*van Someren*); Diani Beach, ix. 1951, 1 ♂ (*N. L. H. Krauss*); Tanger province, ix. 1950, 1 ♂ (*R. C. H. Sweeney*); Ukumbani, Nzoi, i-ii. 1889, 1 ♀, 1 ♂ (BMNH). MALAWI: Valley of N. Rukuru, Karonga district, 2000-4000', 15-18.vii.1910, 1 ♀ (*S. A. Neave*) (paratype of *A. marshalli*) (NMR). NIGERIA: Yola, 1 ♂ (*L. N. Lee*); Kano, Azare, 4.ix.1925, 1 ♀ (*L. Lloyd*) (BMNH). RHODESIA: Salisbury, 1 ♀ (G. A. K. Marshall) (paratype of *A. marshalli*) (NMR); Salisbury, i-iv. 1900, 2 ♀, 1 ♂; xi. 1903, 1 ♂; i. 1905, 1 ♀ (G. A. K. Marshall); Shangani, de Beer's ranch, v. 1932, 1 ♂ (*J. Ogilvie*) (BMNH); S. Rhodesia, 9.xi.1935, 1 ♂ (*R. H. R. Stevenson*) (NMR); Matopos National Park, in Malaise trap, 1-2.iv.1968, 2 ♂ (*P. J. Spangler*) (USNM). SENEGAL: Dakar, 1907, 1 ♀ (*Waterlot*) (MNHN). SIERRA LEONE: no further data, 2 ♀ (*Moquerys*) (MNHN); Freetown, Tower Hill, iii. 1908, 1 ♂ (*A. Pearse*) (BMNH). SOUTH AFRICA: Algoa Bay, 31.iii.1892, 1 ♀, 1 ♂ (*H. Brauns*) (♀ paratype of *A. marshalli*) (TM); Grahamstown, Strowan, 19.ii.1967, 1 ♀; 26.ii.1967, 1 ♂; 21.i.1968, 1 ♀, 10.iii.1968, 1 ♀, 1 ♂; 17.iii.1968, 1 ♀; 31.iii.1968, 1 ♂ (*C. Jacot-Guillarmod*); Grahamstown, Hilton, 9.iv.1967, 1 ♀ (*C. Jacot-Guillarmod*); Grahamstown, 17-25.i.1970, 1 ♂ (*J. G. H. Londt*); Grahamstown, Belmont Valley, 20.i.1970, 1 ♂; 26.i.1970, 1 ♂ (*F. W. Gess*); Kenton-on-Sea, in Malaise trap, iii. 1971, 1 ♀ (*R. A. Jubb*); Howison's Poort, in Malaise trap, 1-7.ii.1972, 1 ♀ (*F. W. Gess*) (AM); Transvaal, 5 miles W. of Warmbad, 24-25.ii.1968, 1 ♂ (*Krombein & Spangler*) (USNM). SUDAN: West Darfur, N. Jebel Murra, Killing, 29.vi.1932, 2 ♀ (*M. Steele*) (BMNH). TANZANIA: Stigi, x. 1917, 1 ♂ (*G. D. H. Carpenter*) (BMNH). ZAIRE: Elizabethville, 21.v.1923, 2 ♂ (*M. Bequaert*) (MRAC); Kabinda, Lomami, 1 ♀ (*J. Muller*) (IRSNB); Coquilatville, 1 ♀ (NMR). ZAMBIA: Upper Luangwa River, 27.vii.-13.viii.1910, 1 ♀ (*S. A. Neave*) (paratype of *A. marshalli*); 16°S., 26°E., 25.viii.1967, 1 ♀ (BMNH).

Atopopompilus nefas (Dalla Torre)

(Text-figs 7, 16, 21, 26, 34)

Salix collaris Saussure, 1891: 263. Holotype (?) ♀, MADAGASCAR (originally in MHN, Geneva, but not located and presumed lost).

Salius (*Schistosalius*) *collaris* Saussure; Saussure, 1892 : 322; ♀.

Pompilus nefas Dalla Torre, 1897 : 304. Replacement name for *Salius collaris* Saussure, 1891, junior secondary homonym in *Pompilus* of *Sphex collaris* Fabricius, 1775.

Paracyphononyx nefas (Dalla Torre) Haupt, 1929 : 168; ♀, ♂.

Psammoderes collaris (Saussure) Banks, 1941 : 353; ♀.

Atopopompilus nefas (Dalla Torre) Haupt, 1950 : 56; ♀.

TYPE-MATERIAL. *Salius collaris* Saussure. The original description of the female clearly applies to this distinctive species, but Saussure did not indicate whether he saw more than one specimen. He gives a length of 17 mm. Two very similar females, both more than 20 mm in length, but otherwise agreeing well with the description, are in the collections of the MHN, Geneva; there is some ambiguity in the attached labels of one specimen. Both bear blue printed labels, 'NOSSI BE', and a second label, printed 'Madagascar' above handwritten 'H. de Saussure'. One female also bears a label in Saussure's hand, '*Salius collaris* ♀ Ss', and a pink printed label, 'Madagasc. Antananarivo'. In 1892, Saussure gave a more detailed description of *S. collaris*, and recorded the species from Antananarivo. Saussure wrote 'Capturée dans la région d'Antananarivo', and I believe his use of the singular denotes a single specimen rather than the species.

Both females are mounted on thick pins. Saussure's handwritten label also has pinholes smaller than those made by the thick pin of the specimen currently bearing this label.

I believe it probable that the holotype was badly damaged and discarded at some time in the past; as a matter of continuity of interpretation, some person perhaps attached the labels to a more satisfactory conspecific specimen which, however, probably postdates description. I have glued the pertinent labels to a separate card, to preserve them in their present state. I presume the holotype to be permanently lost. However, Saussure's figure (1892: pl. 23, fig. 13) is quite sufficient to identify the species satisfactorily.

♀. Length 11–22 mm. Black; head except mouthparts, most of pronotum, occasionally mesonotum and scutellum orange-brown to dark red-brown. Erect hairs of face and pronotum much as in other species of the genus, but substantially reduced on rest of thorax. Pubescence dark, sometimes reflecting obscurely violaceous or blue; with a little silvery adpressed pubescence on propodaeum, frequently lost.

Antennal segments fairly thick, second flagellar segment approximately $4 \times$ as long as thick. Inner orbits converging above and below, but much less strongly so above than in Ethiopian species (Text-fig. 7). SMC₃ narrowed above, but configuration of SMC₂ and SMC₃ very variable. Propodaeum distinctively modified (Text-fig. 16), with a pair of bluntly pointed postero-lateral prolongations and a shallow median longitudinal impression. Sides of propodaeum almost parallel, very slightly constricted in between spiracle and posterior prolongation.

♂. Length 11–15 mm. Black; head (except mouthparts and, occasionally, ocellar region), frequently pronotum, and occasionally mesonotum and scutellum, light or dark red-brown. Erect hair and pubescence mostly black, but silvery on lower face and coxae, occasionally silvery or brownish on propodaeum. Wings fuscous with darker margin.

Antennae roundly crenulate below (Text-fig. 26). Facial carina reaches onto clypeus, but does not fork (Text-fig. 34). Inner orbits not strongly convergent above, sub-parallel below, UID clearly exceeds LID. Propodaeum with distinct declivity and lateral prolongations as in female, but less strongly so. Erect hair of propodaeum quite marked, but much less dense than on Ethiopian species. Genitalia as in Text-fig. 21.

The name *Salius collaris* is permanently rejected under Article 59(b)(i) of the *International Code of Zoological Nomenclature*, as amended on 30 September, 1972.

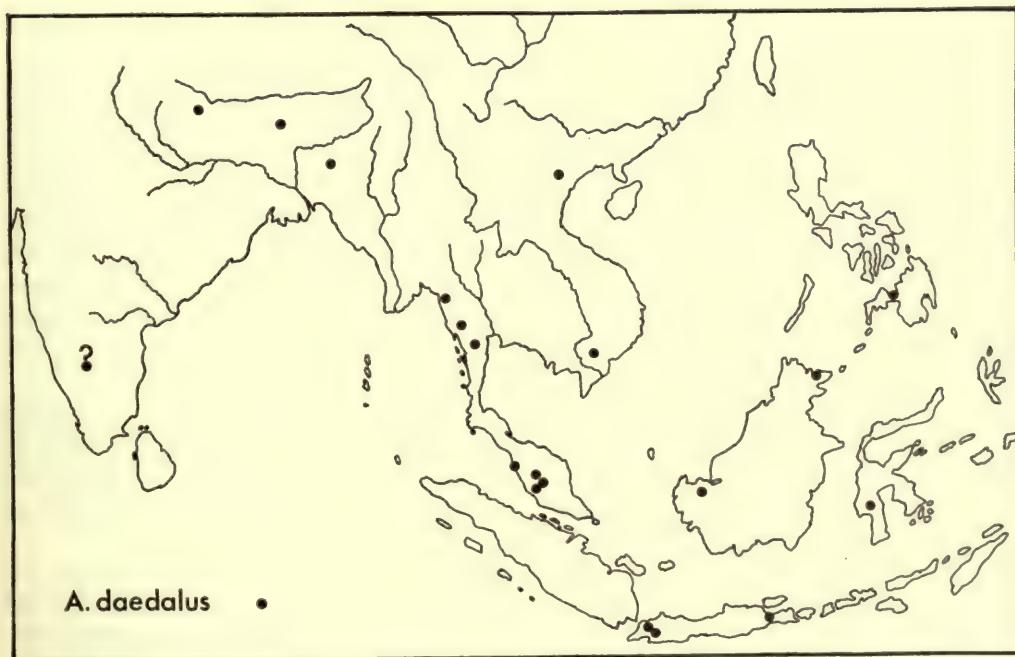
Haupt (1929) correctly identified the male of *A. nefas*. However, Arnold did not include the Madagascan fauna in his works, and was not familiar with this species.

DISTRIBUTION. Madagascar; summarized on Map 1, p. 60.

VARIATION. *A. nefas* is a variable species, with no strong geographic component in its variation. Specimens with extensive orange-brown coloration on head and thorax occur sympatrically with others which have the areas of coloration substantially reduced and the colour deepened to dark red-brown. In addition, morphological characters such as the shape of the face and the form of the sub-marginal cells are noted to vary quite widely. I cannot, however, find any basis for recognition of undescribed taxa in the material available for study; although selected individuals may superficially appear quite different, intermediates can always be found.

MATERIAL EXAMINED.

MADAGASCAR: Betsilei, 1880, 3 ♂ (*D. Cowan*) (BMNH); Tananarive, 1914, 1 ♂; 1916, 1 ♀; 1919, 1 ♀ (*Waterlot*) (MNHN); Tananarive, 1 ♂ (*Plason*) (MRAC); Tananarive, 1 ♂ (*Sikora*) (MNHU); Manjakatampo, 3.i.1958, 1 ♀ (*F. Keiser*); Antisabe, 15.i.1958, 1 ♀ (*F. Keiser*) (NM); Tzimbazaza, 19.xi.1947, 1 ♂ (ISM); Ambalavao, ix-x. 1938, 1 ♀ (*C. Lamberton*) (USNM); Joffreville, 8.v.1958, 1 ♂



MAP 2. Distribution of *Atopopompilus* in the Oriental region.

(*Keiser*) (NM); Antanambe, 1 ♀ (USNM); Ambohimaso, Tsarafidy Forest, 1450 m, xii. 1959-i. 1960, 1 ♀ (*P. Griveaud*) (ISM); Ambatolampy, 1931, 2 ♀ (*Lasere*) (MNHN); Ambatolampy, 1.1.1958, 1 ♀ (*Keiser*) (NM); Fianarantsoa, Anosimparihy, 9.viii.1958, 1 ♀ (*Keiser*) (NM); Ranomafana, 21.1.1958, 1 ♀; 10-11.ix.1958, 2 ♂ (NM & coll. Wahis); Rogez, v. 1936, 1 ♀; iv. 1937, 3 ♀ (*A. Seyrig*) (MNHN); Rogez, Analandrarak, vi. 1937, 1 ♂ (*A. Seyrig*) (coll. Wahis); near Rogez, 900 m, 1946, 2 ♀ (*C. Lambertson*) (USNM & coll. Wahis); Perinet, 500 m, 6-12.v.1968, 1 ♀ (*K. M. Guichard*) (BMNH); Perinet, no further data, 1 ♀ (ISM); Perinet, xii. 1957-x. 1958, 4 ♀, 3 ♂ (*Keiser*) (NM); Moramanga, 9.x.1958, 2 ♀ (*Keiser*) (NM); Ambohimombo, 1894, 1 ♀ (*Forsyth-Major*) (BMNH); Inosy, ii. 1933, 1 ♂ (*A. Seyrig*) (MNHN); Tulear, Sakaraha, 12.iii.1958, 1 ♀ (*Keiser*) (NM); Fort Dauphin, 1913, 1 ♀ (*Gruvel*) (MNHN); Nossi Be, 2 ♀ (MHN); no further data, 1919, 2 ♀ (*J. de Gaulle*) (MNHN & coll. Wahis).

Atopopompilus daedalus (Bingham) **comb. n.**

(Text-figs 3, 4, 14, 22, 24, 29, 30)

Pompilus daedalus Bingham, 1896 : 429. LECTOTYPE ♀, BURMA (BMNH), here designated [examined].

Anoplus styru Cameron, 1903 : 327. Holotype ♂, INDIA (BMNH) [examined]. **Syn. n.**

Ceropales pruinosa Cameron, 1905 : 415. LECTOTYPE ♂ (not ♀, as originally stated), INDIA (UM, Oxford), here designated [examined]. **Syn. n.**

[*Anoplinellus clotho* (Smith) sensu Banks, 1934 : 84; ♀. Misidentification.]

Anoplinellus undescribed sp.; Banks, 1934 : 84; ♀.

Anoplinellus javanus Haupt, 1935 : 318. LECTOTYPE ♀, JAVA (NM, Basle), here designated [examined]. **Syn. n.**

LECTOTYPE DESIGNATIONS. (1) *Pompilus daedalus* Bingham. The description cites 'Sikkim; Tenasserim', as localities, and gives a range of measurements. Six conspecific females in the BMNH collections are from three localities in Tenasserim, Burma; from Sikkim; and from Darjeeling. All are originally from the Bingham collection. Two bear labels in Bingham's handwriting, one 'Pompilus daedalus Bingham ♀ Type' and the other 'Pompilus daedalus Bingham ♀'. The specimen labelled 'type' has 'the antennae, tibiae and tarsi dull piceous red' and thus agrees best with the description, since the other females are more nearly black. I have labelled, and here designate as lectotype, the female which bears Bingham's type label.

(2) *Ceropales pruinosa* Cameron. A male bearing Cameron's label, 'Ceropales pruinosa Cam. type' stands next to a second male in the Rothney collection in UM, Oxford. Although the description states '♀', both males fit the description well, and it can only apply to this sex. I have labelled, and here designate as lectotype, the male which bears Cameron's type label.

(3) *Anoplinellus javanus* Haupt. Haupt lists two females from Gedeh after his description, and states '1 ♀ in meiner stammlung [*sic*]'. This specimen, now in the ZM, Halle, bears Haupt's 'cotype' label, and is conspecific with the female in NM, Basle, which bears Haupt's holotype label. Both agree well with the description. I have labelled, and here designate as lectotype, the Basle specimen.

♀. Length 11–20 mm. Black; wings infusate with darker margin; some populations with small more or less hyaline areas in forewing, more so in hind wing. With extensive silver or grey pubescence, particularly silver on face, thorax and coxae, more greyish on anterior of tergites. Otherwise brown pubescent. Erect hair of head and thorax extensive, very long, exceeding thickness of scape.

Antennae particularly elongate, thin, second segment of flagellum at least $5.0 \times$ as long as wide. Front very narrow, MID about $0.5 \times$ TFD in smaller specimens, less in larger specimens. Vertex in facial view below level of eyes in large specimens. Inner orbits strongly convergent above and below (Text-fig. 4). Thorax typical of genus; propodaeum similar to that of *A. carinatus*, but shorter; declivity more concave (Text-fig. 14), with a central area of aciculation; lateral angles more or less flattened at 45 degrees or slightly protuberant dorsally. Dorsum and lateral angles with abundant, tangled brown-silver pubescence in addition to long erect hairs. SMC₃ narrowed above, normally much shorter on radial vein than is SMC₂, and approximately equal to or shorter than SMC₂ on cubital vein.

♂. Length 8–12 mm. Black; ventral surface of scape, most of clypeus, facial carina, lines bordering inner orbits and temples, posterior pronotal margin, and spot on dorsal surface of hind tibia, yellow. Antennae sometimes reddish ventrally; seventh tergite sometimes with white spot. With much silvery erect hair, especially dense on posterior third of propodaeum; silvery pubescence widely distributed, merging to greyish on anterior halves of tergites. Wings fuscohyaline with infusate margins.

Antennae (Text-fig. 24) short, each segment with sharp ventral angle when viewed in profile. Facial carina just reaches upper margin of clypeus (Text-figs 29, 30), otherwise very similar to *A. carinatus*. Genitalia as in Text-fig. 22.

This distinctive species is sole representative of its genus in the Orient. All the names in the above synonymy were proposed in works of limited scope which simply described new taxa.

Surprisingly, specimens in collections have often been misdetermined as various of the nominal species which are synonyms of *Anoplius* (*Orientalanoplius*) *canifrons* Smith, 1855. It would appear that *A. daedalus* has often been taken together with this species of *Anoplius*, but in fewer numbers; cursory examination of series must have resulted in failure to segregate these females, which have a similar colour pattern.

Ceropales (and Ceropalidae) was used by Cameron in 1905 to replace *Pompilus* (and Pompilidae) which at that time was thought to be preoccupied in the Octopoda.

DISTRIBUTION. Forest areas of the Oriental and Indonesian regions; summarized on Map 2, p. 65.

VARIATION. Size variation produces minor allometric differences. For example, larger females have the face and vertex sunk beneath the contour of the eyes, whilst smaller females have the face more nearly in the same plane as the surface of the inner orbits; thus, the eyes of large specimens appear to bulge when compared with those of smaller females.

The Javan population does not have uniformly infusate wings in the female.

MATERIAL EXAMINED.

Pompilus daedalus Bingham, lectotype ♀, BURMA: Tenasserim, Thaungyin Valley, vi. 1894 (C. T. Bingham) (BMNH). *Anoplius styrys* Cameron, holotype ♂, INDIA: Sikkim? (BMNH). *Ceropales pruinosa* Cameron, lectotype ♂, INDIA: Khasia Hills

(*Rothney*) (UM, Oxford). *Anoplinellus javanus* Haupt, lectotype ♀, JAVA: Tjibodas, Gedeh, 1400–1600 m, viii. 1931 (*Handschin*) (NM, Basle).

BORNEO: Sandakan, 1 ♀ (*C. F. Baker*) (MCZ); Sarawak, Mt Dulit, 4000', moss forest, 16.x.1932, 1 ♀ (*B. M. Hobby & A. W. Moore*) (misdet. 'Orientanoplius iliacus, Haupt, 1937'), (BMNH). BURMA: Tenasserim, Tavoy Valley, iii. 1893, 1 ♀ (paralectotype of *P. daedalus*); Maulmain, v. 1889, 1 ♀ (paralectotype of *P. daedalus*); Thaugyin Valley, vi. 1894, 1 ♂ (*C. T. Bingham*) (BMNH). INDIA: S. India, no further data, 1 ♀ (*C. T. Bingham*); Sikkim, Runjit Valley, iv. 1894, 2 ♀ (paralectotypes of *P. daedalus*); Darjeeling, 7000', 31.iii.1894, 1 ♀ (*C. T. Bingham*) (paralectotype of *P. daedalus*); Khasia Hills, 6 ♀ (BMNH); Khasia Hills, 1 ♀ (*Rothney*) (UM). JAVA: Tjibodas, Gedeh, 1400–1600 m, viii. 1931, 1 ♀ (*Handschin*) (paralectotype of *A. javanus*) (ZM); same data, v. 1935, 1 ♀, 1 ♂ (*V. d. Vecht*) (MCZ); same data, 1 ♀, 1 ♂ (*Vecht*) (NMR); Mt Djampang, Tjigaeha, i–ii. 1938, 6 ♀; Salatry, xi. 1937, 1 ♀; i. 1938, 1 ♀; Gunung Malang, 3000–4000', x. 1937, 2 ♀; East Java, Tengger Highlands, 1100 m, v. 1938, 3 ♀; Soekaboemi, i. 1938, 1 ♀ (*K. M. Walsh*) (BMNH). NEPAL: Gum and Lumsa, 7000', 27.viii.1952, 1 ♂ (*BM Expedn to Nepal*) (BMNH). NORTH VIETNAM: Hoa Binh, 1926, 1 ♂ (*A. de Cooman*) (MNHN); Hoa Binh, viii. 1918, 1 ♀ (*R. V. de Salvaza*) (BMNH). PHILIPPINE ISLANDS: Mindanao, Iligan, 1 ♀ (*C. F. Baker*) (USNM). SIAM?: Biserat, 1 ♀ (BMNH). SOUTH VIETNAM: Tay Ninh, 20.xii.1923, 1 ♀; 10.xi.1924, 1 ♀; 29.xi.1924, 1 ♀ (*R. V. de Salvaza*) (IRSNB). SULAWESI: Latimodjong Mts, Bontoe Batoe district, 4000', v. 1931, 2 ♀ (*C. F. Clagg*) ('undescribed species' of Banks, 1934) (MCZ). WEST MALAYSIA: Pahang, Fraser's Hill, 20.vii.1936, 1 ♀; Pahang, Cameron Highlands, Ginting Kial, 5000', 18.vii.1938, 1 ♂; 22.v.1939, 1 ♀; 27.v.1939, 1 ♀, 1 ♂; 4700'–5100', 12.v.1939, 1 ♀; Selangor, Kuala Sleh, 17.v.1936, 1 ♀; Bukit Kutu, 3500', 9.ix.1929, 1 ♀ (*ex colln Fed. Malay States Mus.*) (BMNH); Cameron Highlands, Rhododendron Hill, 1.x.1935, 1 ♀; Penang, Ayerltam Reservoir, 8.viii.1968, 1 ♀ (*H. T. Pagden*) (BMNH).

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A GUIDE TO THE GENERA
AND SPECIES OF PARNASSIINAE
(LEPIDOPTERA : PAPILIONIDAE)

P. R. ACKERY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 31 No. 4
LONDON i 1975



1



4



2



5



6



3



7

FRONTISPIECE

Representatives of the seven genera comprising the Parnassiinae (natural size)

- FIG. 1. *Parnassius apollo apollo* (Linnaeus) ♀ (Sweden)
- FIG. 2. *Seriginus montela montela* Fruhstorfer ♂ (China: Kiangsi)
- FIG. 3. *Bhutanitis thaidina thaidina* (Blanchard) ♂ (China: Szechwan)
- FIG. 4. *Archon apollinus apollinus* (Herbst) ♂ (Turkey)
- FIG. 5. *Hypermnestra helios helios* Nickerl ♂ (U.S.S.R.: Turkmenistan)
- FIG. 6. *Parnalius polyxena polyxena* (Denis & Schiffermüller) ♂ (Hungary)
- FIG. 7. *Luehdorfia puziloi puziloi* (Erschoff) ♂ (U.S.S.R.: Russia, Primorye)

A GUIDE TO THE GENERA AND SPECIES OF
PARNASSIINAE (LEPIDOPTERA : PAPILIONIDAE)



BY
PHILLIP RONALD ACKERY
lc

Pp. 71-105; 16 Plates, 32 Text-figures

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A GUIDE TO THE GENERA AND SPECIES OF PARNASSIINAE (LEPIDOPTERA : PAPILIONIDAE)

By P. R. ACKERY

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SYNOPSIS

Illustrated keys are given to the seven genera and 44 species of Parnassiinae here recognized, together with brief notes on the distribution and larval food plants of each species. For polytypic species a list is given of the subspecies that differ most markedly from the typical form. One generic synonym is newly established.

INTRODUCTION

THE inconsistency of the wing pattern within many species of the Parnassiinae has inspired the description of numerous subspecies and forms, principally in the works of Fruhstorfer, Bang-Haas, Bryk and Eisner. Thus, although the literature is extensive, it is concerned mainly with intra-specific variation rather than the definition and identification of the recognized species. Bryk (1934; 1935) includes keys to the Parnassiinae in his extensive monograph; however, the lack of availability of this work, together with the great emphasis placed on variation within species throughout the study, renders it unsuitable as a ready means of identification to species. It is hoped that this present work will to some degree fill this apparent gap in the literature available to lepidopterists interested in the Parnassiinae.

There has been considerable difference of opinion concerning the higher classification of this subfamily, the two tribes here recognized, the Parnassiini and Zerynthiini, being regarded by Bryk (1934; 1935) and Ford (1944) as subfamilies, while Clench

(1955) and Hemming (1960) have suggested that they be accredited with family status. I have followed Ehrlich (1958) and Munroe (1960) in treating the two groups as tribes which together form the subfamily Parnassiinae.

At the generic and specific levels there has been more general agreement, except over the status of the genus *Parnassius* and its species (see pp. 76-77). *Serycinus*, *Archon* and *Hypermnestrea* are at present monotypic, *Bhutanitis* contains four species and the far-eastern genus *Luehdorfia* consists of two species. *Allancastris*, hitherto a valid monotypic genus, is here considered to be a junior synonym of *Parnalius*, which now includes three species. I have adopted Munroe's (1960) broad concept of *Parnassius*, which is regarded here as comprising 32 species. Examples of each genus are illustrated in the Frontispiece, figs 1-7.

To include notes on all the described forms is certainly not the purpose of this work. I have, however, listed under the relevant species some of those subspecies that seem to differ most markedly from the more typical forms, together with their localities and points of difference. No attempt has been made to produce a comprehensive list of all the subspecies described.

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KEY TO THE GENERA OF PARNASSIINAE

- | | | | |
|---|--|--|---|
| 1 | Outer margin of hindwing rounded, without tails | (Parnassiini) | 2 |
| - | Tails of various lengths present on the outer margin of hindwing (Zerynthiini) | | 4 |
| 2 | (1) Claspers of male narrow (Text-fig. 1); forewing with five radial veins (Text-fig. 18) | ARCHON Hübner (p. 75) | |
| - | Claspers of male various, never narrow; forewing with four radial veins | | 3 |
| 3 | (2) Male tarsal claws equal (Text-fig. 29) | HYPERMNESTREA Ménétriés (p. 75) | |
| - | Male tarsal claws sub-equal (Text-fig. 30) | PARNASSIUS Latreille (p. 76) | |
| 4 | (1) Vein M_3 of hindwing produced to a short tapering or rounded tooth (Text-figs 17, 19) | PARNALIUS Rafinesque (p. 90) | |
| - | Vein M_3 of hindwing produced to a distinct tail | | 5 |
| 5 | (4) Uncus short, bifid (Text-fig. 16); hindwing tail on vein M_3 longer than the discal cell of hindwing; vein R_3 of forewing usually arising from discal cell (Text-fig. 26) | SERICINUS Westwood (p. 90) | |
| - | Uncus elongate, bifid; hindwing tail on vein M_3 no longer than the discal cell; vein R_3 normally stalked with R_{4+5} | | 6 |
| 6 | (5) Precostal cell wide; tails well developed on veins Cu_{1a} and Cu_{1b} of hindwing (Text-fig. 25); internal ventral surface of claspers smooth (Text-figs 14, 15) | BHUTANITIS Atkinson (p. 93) | |

- Precostal cell narrow; tails rudimentary on veins Cu_{1a} and Cu_{1b} of hindwing (Text-fig. 23); internal ventral surface of claspers spinose (Text-figs 12, 13)
LUEHDORFIA Crüger (p. 92)

NOTES ON THE GENERA, WITH KEYS TO THE SPECIES
WHERE APPLICABLE

Tribe **PARNASSIINI**

Parnassinae Swainson, 1840 : 87, 90. Type-genus: *Parnassius* Latreille.

ARCHON Hübner

[*Doritis* Fabricius sensu Hübner, [1819] : 86.]

Archon Hübner, [1822] : 2, 6, 8, 9. Type-species: *Papilio thia* Hübner, by subsequent designation (Scudder, 1875 : 117).

Dorarchon Rothschild, 1918 : 219. Type-species: *Papilio apollinus* Herbst, by monotypy.

Archon Hübner; Bryk, 1934 : 19.

Archon Hübner; Munroe, 1960 : 10.

The name *Doritis* is still commonly used for this taxon, although *Papilio apollo* Linnaeus is clearly the type-species of *Doritis*, not *Papilio apollinus* Herbst as was erroneously believed.

Archon apollinus (Herbst)

(Pl. 1, figs 1, 2, Text-figs 1, 18)

Papilio apollinus Herbst, 1798 : 156.

Papilio thia Hübner, [1806] : 60.

Archon apollinus (Herbst); Bryk, 1922 : 224; 1934 : 23.

Archon apollinus (Herbst); Eisner, 1966 : 89.

DISTRIBUTION. Rumania. Bulgaria. Turkey. U.S.S.R.: Armenia, Turkmenistan. Greece. Syria. Iraq. Lebanon. Israel.

LARVAL FOOD PLANTS. *Aristolochia hastata* (Higgins & Riley, 1970). *A. bodame* (Bryk, 1934). *A. maurorum* (Suguru Igarashi, in litt.).

HYPERMNESTRA Ménétriés

Ismene Nickerl, 1846 : 207. Type-species: *Ismene helios* Nickerl, by monotypy. [Junior homonym of both *Ismene* Savigny, 1816, and *Ismene* Swainson, 1820.]

Hypermnestra Ménétriés, 1848 : pl. 6, fig. 1. [Replacement name for *Ismene* Nickerl.]

Hypermnestra Ménétriés; Bryk, 1935 : 4.

Hypermnestra Ménétriés; Munroe, 1960 : 10.

Ehrlich (1958) says that there are reports of *Parnassius* species in which the males have nearly symmetrical claws as in *Hypermnestra* Ménétriés; however, I have always found the tarsal claws of male *Parnassius* to be subequal.

***Hypermnestra helios* (Nickerl)**

(Pl. 1, figs 3, 4, Text-figs 2, 20, 29)

Ismene helios Nickerl, 1846 : 208, pl. 3, figs a-g.*Hypermnestra helios* (Nickerl); Bryk, 1935 : 7.*Hypermnestra helios* (Nickerl); Eisner, 1966 : 121

DISTRIBUTION. Iran. Afghanistan. U.S.S.R.: Uzbekistan, Kirghizia.

LARVAL FOOD PLANTS. *Zygophyllum* (Munroe, 1960). *Z. turcomanicum* (Verity, 1906). *Z. atriplicoides* (Bryk, 1935). *Z. fabago*, *Z. portulacoides* (Eisner, 1968). *Z. gontsharovii* (Stschetkin, 1963).**PARNASSIUS Latreille***Parnassius* Latreille, 1804 : 185, 199. Type-species: *Papilio apollo* Linnaeus, by monotypy.*Doritis* Fabricius, 1807 : 283. Type-species: *Papilio apollo* Linnaeus, by subsequent designation (Dalman, 1816 : 60).*Tadumia* Moore, 1902 : 116. Type-species: *Parnassius acco* Gray, by original designation. [Synonymized by Munroe, 1960 : 11.]*Kailasius* Moore, 1902 : 118. Type-species: *Parnassius charltonius* Gray, by original designation. [Synonymized by Munroe, 1960 : 11.]*Koramius* Moore, 1902 : 120. Type-species: *Parnassius delphiuss* Eversmann, by original designation. [Synonymized by Munroe, 1960 : 11.]*Lingamius* Bryk, 1935 : 538-540. Type-species: *Parnassius hardwickii* Gray, by original designation. [Synonymized by Munroe, 1960 : 11.]*Eukoramius* Bryk, 1935 : 630, 673-674. Type-species: *Parnassius imperator* Oberthür, by monotypy. [Synonymized by Munroe, 1960 : 11.]

Bryk (1935) divides *Parnassius* into five genera on the basis of differences in the wing venation and relative lengths of the foretibial epiphysis. As shown by Munroe (1960) the groups so defined do not agree with those indicated by the male genitalia. I am adopting Munroe's broad concept of this genus, but not his suggested division into two subgenera, *Parnassius* s. str. and *Doritis*. The latter name cannot have any valid use as it is a junior objective synonym of *Parnassius*.

Elwes (1886) attempted to define the limits of the species, focusing attention on the wide differences in the shape of the sphragis. The comparative morphology of the species is discussed by Hering (1932) who recognizes only six distinct species, this arrangement being followed by Fisher (1950). A revision of the *mnemosyne* group is presented by Müller (1973), partly based on new morphological characters derived from the comparative structure and arrangement of the wing scales.

Valuable information on this genus is to be found in some of the faunistic studies on butterflies. Kurentsov (1970) illustrates and discusses the *Parnassius* of the eastern U.S.S.R. and the distinguishing characters exhibited by the three western Palearctic species are given by Higgins & Riley (1970). Yokohama & Wakabayashi (1968) illustrate the representatives in the Japanese fauna, whilst five species are included by Seok (1939) in his check list of Korean butterflies. The Asian species, *nomion* Fischer de Waldheim, is doubtfully listed by Wilson (1961) in his identification key of North American Papilionidae, but excluded by Dos Passos (1964).

The studies of the Indian fauna provide useful keys, notably in the works of Evans (1927) and Talbot (1939). A complete key to the 34 species then recognized is given by Bryk (1935). Munroe (1960) notes 37 species, five more than Eisner (1966), but the only species included here are those listed by Eisner in his index to the 'Parnassiana' and 'Parnassius Nova' series.

The apparent uniformity of structure within the species-groups, as defined by Munroe (1960), together with the multiplicity of variations in the wing pattern within most of the species, presents some difficulty in the preparation of a key to the species of *Parnassius*. The wing pattern is used as the principal means of differentiating between the species since the structural characters derived from the genitalia, wing venation, sphragis and foretibial epiphysis, are generally applicable at the species-group level only. As the following key is based on wing pattern at the species level, it is to be expected that atypical specimens, particularly in the *actius-jacquemontii-phoebus* subgroup, will not always run out satisfactorily. It must therefore be emphasized that the present work should be used only as a guide.

This genus is generally distributed throughout the mountainous and northern areas of the Palaearctic and western Nearctic regions, the inaccessibility of many likely localities probably accounting for the rarity of some species.

KEY TO THE SPECIES OF *PARNASSIUS* LATREILLE

- 1 Uncus normally plainly visible, spatulate, lying between the two elongate processes on the tenth tergite (Text-fig. 31); sphragis keeled and with a simple, single, backward-pointing flange (Pl. 15, fig. 98) [keel lacking in *epaphus* Oberthür]; hindwing upperside lacking submarginal series of blue spots 2
- Uncus sometimes enclosed by eighth abdominal tergite and bifid, never spatulate (Text-fig. 32) [simple and truncate in *simo* Gray]; sphragis various, never keeled and always lacking a single backward-pointing flange (Pl. 15, figs 99-105); hindwing upperside often with submarginal series of blue centred spots 16
- 2 (1) Antennae dark, lacking white scales 3
- Antennae with some white scales 5
- 3 (2) Submarginal band of forewing and hindwing broken up into a distinct series of internervular black spots (Pl. 1, figs 5, 6) . *apollonius* (Eversmann) (p. 80)
- Submarginal band of hindwing indistinct or absent 4
- 4 (3) Pubescence of body mostly pale beneath; wing veins above exceptionally distinct, with a covering of black scales; forewing above usually lacking red markings (Pl. 2, figs 9, 10) *bremeri* Bremer (p. 81)
- Body clothed with thick black pubescence beneath; wing veins above without black scales; forewing above usually with red markings (Pl. 1, figs 7, 8) *honrathi* Staudinger (p. 80)
- 5 (2) Scaling of antennae, excluding the club, completely white above 6
- Scaling of antennae, excluding the club, dark and white above 7
- 6 (5) Margins distinctly chequered, being black about the wing veins and white in the internervular areas; upper surface of hindwing often with a distinct red basal spot (Pl. 3, figs 17, 18) *nomion* Fischer de Waldheim (p. 82)
- Margins usually white, sometimes indistinctly chequered; upper surface of hindwing seldom with a red basal spot (Pl. 3, figs 23, 24) *apollo* (Linnaeus) (p. 83)

7	(5)	Males	8
-		Females	12
8	(7)	Eighth abdominal tergite rounded postero-laterally	9
-		Eighth abdominal tergite pointed postero-laterally	10
9	(8)	Marginal and submarginal forewing bands poorly developed; ground colour of upperside creamy white; discal spot in cell Cu_{1b} of forewing upperside absent or rudimentary, seldom distinctly scaled below and never centred with red (Pl. 2, fig. 11) <i>phoebus</i> (Fabricius) (p. 81)	
-		Marginal and submarginal bands of forewing well developed; ground colour of upperside grey-white, often distinctly dusted with black; discal spot in cell Cu_{1b} of forewing upperside usually present, distinctly scaled below and often centred with red (Pl. 3, fig. 21) <i>tianschanicus</i> Oberthür (p. 82)	
10	(9)	Basal red spot usually present in hindwing upperside; discal spot in cell Cu_{1b} of forewing underside often heavily scaled, sometimes centred with red (Pl. 2, fig. 15) <i>jacquemontii</i> Boisduval (p. 81)	
-		Basal red spot normally absent from the hindwing upperside, if present the discal spot in cell Cu_{1b} of forewing underside is lightly scaled, not centred with red	11
11	(10)	Black basal scaling normally quite extensive; margins of forewings usually distinctly chequered, being black about the veins and white in the inter-nervular areas (Pl. 3, fig. 19) <i>epaphus</i> Oberthür (p. 82)	
-		Black basal scaling usually less extensive; margins of forewing seldom distinctly chequered (Pl. 2, fig. 13) <i>actius</i> (Eversmann) (p. 81)	
12	(7)	Sphragis lacking a keel (Pl. 3, fig. 20) <i>epaphus</i> Oberthür (p. 82)	
-		Sphragis strongly keeled	13
13	(12)	Discal spot in cell Cu_{1b} of forewing underside distinctly scaled; red basal spot never present in hindwing upperside; upperside distinctly dusted with black scales (Pl. 3, fig. 22) <i>tianschanicus</i> Oberthür (p. 82)	
-		Discal spot in cell Cu_{1b} of forewing underside normally only lightly scaled, if distinctly scaled then red basal spot normally present in hindwing upperside; upperside not distinctly dusted with black	14
14	(13)	Abdomen usually hairy, almost as much so as the male [Asian species only] (Pl. 2, fig. 14) <i>actius</i> (Eversmann) (p. 81)	
-		Abdomen not exceptionally hairy [except European <i>phoebus</i>]	15
15	(14)	Hindwing upperside normally with a distinct red basal spot [Asian species only] (Pl. 2, fig. 16) <i>jacquemontii</i> Boisduval (p. 81)	
-		Hindwing upperside seldom with a distinct red basal spot [N. American, European & Asian species] (Pl. 2, fig. 12) <i>phoebus</i> (Fabricius) (p. 81)	
16	(1)	Foretibial epiphysis short, not reaching the end of the tibia (Text-fig. 27); hindwing upperside without a submarginal series of blue spots (except <i>orleans</i> Oberthür)	17
-		Foretibial epiphysis longer, often reaching the end of the tibia (Text-fig. 28); hindwing upperside usually with a submarginal series of blue spots	24
17	(16)	Hindwing underside lacking red ocelli	18
-		Hindwing underside usually with red ocelli	20
18	(17)	Outer surface of palpi dark, occasionally with a few light yellow scales; face lacking white hairs; bifid uncus with paired ventral processes (Text-fig. 6, Pl. 4, figs 29, 30) <i>glacialis</i> Butler (p. 84)	
-		Outer surface of palpi with white scales; face with some white hairs; bifid uncus without ventral processes	19
19	(18)	Forewing upperside usually with two black spots in the discal cell; clasper of male weakly produced posteriorly, never ending in a long thin point (Pl. 4, figs 25, 26) <i>mnemosyne</i> (Linnaeus) (p. 83)	

- Forewing upperside without two black spots in the discal cell; clasper of male strongly produced posteriorly, ending in a long thin point (Pl. 4, figs 27, 28) *stubbendorfi* Ménétériés (p. 84)
- 20 (16) Face usually with golden yellow pubescence. 21
- Pubescence of face black, pale yellow or white 22
- 21 (20) Basal black scaling of hindwing upperside sharply differentiated; margins of hindwing underside black; wings of male often yellow (Pl. 4, figs 31, 32, Pl. 5, figs 33, 34) *eversmanni* Ménétériés (p. 84)
- Basal dark scaling of hindwing upperside not sharply divided from the white ground colour; margins of hindwing underside partly white; wings of male never yellow (Pl. 5, figs 39, 40) *clodius* Ménétériés (p. 85)
- 22 (20) Hindwing upperside and underside with a submarginal series of internervular blue-centred spots; margins of forewing upperside usually distinctly chequered, black about the veins and white in the internervular areas (Pl. 6, figs 41, 42) *orleans* Oberthür (p. 85)
- Hindwing upperside lacking blue-centred internervular spots; forewing margins never divided into distinct black and white areas 23
- 23 (22) Forewing apex largely hyaline, the submarginal internervular markings usually absent, if present pale and indistinct; veins of hindwing underside pale (Pl. 5, figs 35, 36) *nordmanni* (Nordmann) (p. 85)
- Forewing above with submarginal internervular markings forming a distinct band in the wing apex; veins of hindwing underside dark (Pl. 5, figs 37, 38) *ariadne* Lederer (p. 85)
- 24 (16) Vein R_2 stalked with vein R_{3+5} , not arising from discal cell (Text-fig 24) 25
- Vein R_2 arising from discal cell (Text-figs 21, 22) 28
- 25 (24) Hindwing upperside usually with large red postdiscal spots 26
- Red postdiscal spots of hindwing upperside small or absent 27
- 26 (25) Hindwing blue-black internervular submarginal spots absent from cell R_5 ; sphragis straight (Pl. 9, figs 67, 68, Pl. 15, fig. 105) *inopinatus* Kotsch (p. 89)
- Hindwing blue-black internervular submarginal spot present in cell R_5 ; sphragis coiled (Pl. 9, figs 65, 66, Pl. 15, fig. 104) *charltonius* Gray (p. 88)
- 27 (25) Hindwing upperside without red markings but with an orange postdiscal band, wide in female, narrow in male (Pl. 9, figs 71, 72) *autocrator* Avinoff (p. 89)
- Hindwing upperside with red markings and lacking an orange postdiscal band (Pl. 9, figs 69, 70) *loxias* Püngeler (p. 89)
- 28 (24) Vein R_2 anastomosing with vein R_1 (Text-fig. 21) 29
- Vein R_2 not anastomosing with vein R_1 (Text-fig. 22) 32
- 29 (28) Hindwing upperside usually with large blue-centred submarginal spots; sphragis large, bilobate (Pl. 8, figs 63, 64, Pl. 15, fig. 103) *imperator* Oberthür (p. 88)
- Hindwing upperside seldom with large blue-centred submarginal spots; sphragis never bilobate 30
- 30 (29) Uncus short, strongly bifid; sphragis normally laterally flattened, forming a complete ring about the abdomen (Pl. 7, figs 51, 52, 53, 54) *acco* Gray (p. 86)
- Uncus simple or weakly bifid; sphragis never laterally flattened or forming a complete ring about the abdomen 31
- 31 (30) Uncus short, simple (Text-fig. 8); sphragis rudimentary; hindwing underside with few postdiscal spots (Pl. 10, figs 73, 74) *simo* Gray (p. 89)
- Uncus elongate, weakly bifid (Text-fig. 3); sphragis well formed, distinct; hindwing underside with a complete row of postdiscal spots (Pl. 10, figs 75, 76) *tenedius* Eversmann (p. 89)
- 32 (28) Clasper broad; internal process half to two-thirds the length of the clasper (Text-figs 4, 5); sphragis simple, usually laterally flattened (Pl. 15, fig. 100) 33

- Clasper narrow, distally pointed; internal process one-third the length of the clasper (Text-fig. 7); sphragis bilobate (Pl. 15, figs 101, 102). 35
- 33 (32) Veins of hindwing underside bordered with white scales which cover the veins (Pl. 6, figs 45, 46) *szechenyi* Frivaldsky (p. 86)
- Wing veins clearly visible, not covered by white scales 34
- 34 (33) Male with a distinct row of bristles anterior to the uncus; clasper produced dorsally to a distinct angle (Text-fig. 4); submarginal blue spots of hindwing upperside usually centred with white (Pl. 6, figs 43, 44) *hardwickii* Gray (p. 86)
- Male without a distinct row of bristles anterior to the uncus; clasper large, rounded; submarginal spots of hindwing upperside, when present, seldom centred with white (Pl. 6, figs 47, 48) *cephalus* Grum-Grshimailo (p. 86)
- 35 (32) Sclerotized area of male eighth abdominal tergite produced posteriorly to give two finger-like projections; sphragis produced backwards, forming two lateral points (Pl. 15, fig. 101); basal black scaling of hindwing upperside usually very extensive, often surrounding the red ocelli of hindwing above (Pl. 8, figs 61, 62) *accestis* Grum-Grshimailo (p. 87)
- Sclerotized area of male eighth abdominal tergite not strongly produced, never with finger-like projections; sphragis produced backwards to form two ventral lobes (Pl. 15, fig. 102); basal black scaling of hindwing upperside usually rather less extensive 36
- 36 (35) Submarginal spots of hindwing upperside usually distinct and centred with blue (Pl. 8, figs 57, 58, 59, 60) *delphius* (Eversmann) (p. 87)
- Submarginal spots of hindwing upperside, when present, paler and not centred with blue (Pl. 7, figs 55, 56) *patricius* Niepelt (p. 87)

THE APOLLO-GROUP

Parnassius apollonius (Eversmann)

(Pl. 1, figs 5, 6)

Doritis apollonius Eversmann, 1847 : 71, pl. 3, figs 1, 2.

Parnassius apollonius (Eversmann); Bryk, 1935 : 176.

Parnassius apollonius (Eversmann); Eisner, 1966 : 89.

DISTRIBUTION. U.S.S.R.: Uzbekistan, Tadzhikistan, Kirghizia. China: western Sinkiang.

LARVAL FOOD PLANTS. *Salsola* (Elwes, 1886). *Scabiosa* (Stichel, 1907b). *Radiola semenovi* (A. Tsvetajev, pers. com.)

Parnassius honrathi Staudinger

(Pl. 1, figs 7, 8)

Parnassius honrathi Staudinger, 1882 : 161, pl. 1, figs 4, 5a, pl. 2, fig. 5.

Parnassius honrathi Staudinger & Bang-Haas; Bryk, 1935 : 185.

Parnassius honrathi Staudinger & Bang-Haas; Eisner, 1966 : 122.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan.

***Parnassius bremeri* Bremer**

(Pl. 2, figs 9, 10)

Parnassius bremeri Bremer, 1864 : 6 (Felder in litt.).

Parnassius bremeri Bremer; Felder & Felder, 1865 : 133.

Parnassius bremeri Bremer; Bryk, 1935 : 190.

Parnassius bremeri Bremer; Eisner, 1966 : 94.

DISTRIBUTION. China: Heilunkiang, Shansi, Hopei. U.S.S.R.: Russia (Chita, Khabarovsk, Sakhalin, Kamchatka). Korea.

LARVAL FOOD PLANTS. Various species of *Sedum* (Stichel, 1907b). *S. aizoon*, *S. ischida*, *S. ussuriensis*, *S. quadriflorum* (Kurentsov, 1970).

***Parnassius phoebus* (Fabricius)**

(Pl. 2, figs 11, 12, Text-fig. 31)

Papilio phoebus Fabricius, 1793 : 181.

Parnassius phoebus (Fabricius); Bryk, 1935 : 206.

Parnassius phoebus (Fabricius); Eisner, 1966 : 157.

DISTRIBUTION. Europe: Italy, Austria and Switzerland. [Maritime Alps and eastward to Styria and Grossglockner, rare in north, occasional in Allgäuer Alps (Higgins & Riley, 1970).] U.S.A.: Alaska, Washington, Idaho, Montana, Dakota, Wyoming, California, Nevada, Utah, Colorado, New Mexico. Canada: British Columbia, Alberta. China: Sinkiang. U.S.S.R.: Russia (Irkutsk, Amur), Kazakhstan. Mongolia.

LARVAL FOOD PLANTS. *Saxifraga aizoides*, *Sempervivum montanum* (Higgins & Riley, 1970). *Sedum stenopetalum*, *Sempervivum* and *Saxifraga* (Wilson, 1961). *Sedum telephium*, *S. fabria*, *S. album*, *S. roseum* and *Sempervivum tectorum* (Bryk, 1935). *Saxifraga calycina*, *S. nivalis* (Kurentsov, 1970). *Carex filifolia*, *Gayophytum diffusum*, *Phlox douglasii*, *Sedum debile*, *S. obtusatum*, *S. wrightii* (Tietz, 1972). *Sedum lanceolatum* (= *stenopetalum*) (Scott, 1973).

***Parnassius actius* (Eversmann)**

(Pl. 2, figs 13, 14)

Doritis actius Eversmann, 1843 : 540, pl. 9, figs 2a, b.

Parnassius actius (Eversmann); Bryk, 1935 : 249.

Parnassius actius (Eversmann); Eisner, 1966 : 82.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan, Kirghizia, Kazakhstan. China: Sinkiang, Kansu. Pakistan. Kashmir.

***Parnassius jacquemontii* Boisduval**

(Pl. 2, figs 15, 16)

Parnassius jacquemontii Boisduval, 1836 : 400.

Parnassius jacquemontii Boisduval; Bryk, 1935 : 257.

Parnassius jacquemontii Boisduval; Eisner, 1966 : 128.

Parnassius jacquemontii Boisduval; Ackery, 1973 : 6.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan, Uzbekistan. China: Sinkiang, Kansu, Szechwan. N. India. Pakistan. Tibet.

Variable species. Red basal spot sometimes absent. Superficially many forms resemble *epaphus* Oberthür, but the sphragis of the female always bears a keel.

Subsp. *mercurius* Grun-Grshimailo [Tibet, Amdo], subsp. *jupiterius* Bang-Haas [Kansu, Pulow mont, Minschan], subsp. *tatungi* Bryk & Eisner [Kansu, Richthofen Mts, Nanshan Mts]. Wing margins distinctly chequered.

Subsp. *thibetanus* Leech [Szechwan, How-Kow, Ta-tsen-lou]. Dusted with black scales.

Parnassius epaphus Oberthür

(Pl. 3, figs 19, 20)

Parnassius epaphus Oberthür, 1879 : 23.

Parnassius epaphus Oberthür; Bryk, 1935 : 270.

Parnassius epaphus Oberthür; Eisner, 1966 : 106.

Parnassius epaphus Oberthür; Ackery, 1973 : 5.

DISTRIBUTION. Afghanistan. Pakistan. Kashmir. N. India. Nepal. Sikkim. Tibet. China: Sinkiang, Szechwan, Kansu, Tsinghai.

Variable species. Red basal spot sometimes present causing many specimens to resemble *jacquemontii* Boisduval, but sphragis always without a keel.

Parnassius tianschanicus Oberthür

(Pl. 3, figs 21, 22)

Parnassius corybas var. *tianschanicus* Oberthür, 1879 : 108.

Parnassius tianschanicus Oberthür; Bryk, 1935 : 288.

Parnassius tianschanicus Oberthür; Eisner, 1966 : 184.

DISTRIBUTION. U.S.S.R.: Uzbekistan, Tadzhikistan, Kirghizia. Afghanistan. Pakistan. Kashmir. China: Sinkiang.

Parnassius nomion Fischer de Waldheim

(Pl. 3, figs 17, 18)

Parnassius nomion Fischer de Waldheim, 1823 : 242, pl. 6, figs 3, 4.

Papilio apollo var. *nomion*; Geyer, [1838] : pl. 207, fig. 1029.

Parnassius nomion Hübner; Bryk, 1935 : 300.

Parnassius nomion Hübner; Eisner, 1966 : 149.

DISTRIBUTION. Mongolia. U.S.S.R.: Russia (Irkutsk, Buryat, Amur, Khabarovsk, Altay). China: Kansu, Tsinghai, Shensi, Heilungkiang, Liaoning. Korea. U.S.A.: Alaska?

LARVAL FOOD PLANTS: Yellow-flowered *Sedum* (Elwes, 1886). *S. album* (Bryk, 1935).

Red basal spot sometimes absent causing specimens to resemble *apollo* Linnaeus.

Subsp. ***epaphoides*** Bryk & Eisner [Kansu, Richthofen Mts.]. Much smaller than the typical form.

***Parnassius apollo* (Linnaeus)**

(Pl. 3, figs 23, 24, Pl. 15, fig. 98)

Papilio apollo Linnaeus, 1758 : 465.

Parnassius apollo (Linnaeus); Latreille, 1804 : 199.

Parnassius apollo (Linnaeus); Bryk, 1935 : 325.

Parnassius apollo (Linnaeus); Eisner, 1966 : 89.

DISTRIBUTION. Sweden. Finland. Poland. Germany. France. Spain. Switzerland. Austria. Czechoslovakia. Hungary. Rumania. Italy. Bulgaria. Greece. Albania. Turkey. Syria. U.S.S.R.: Latvia, Lithuania, Ukraine, Armenia, Caucasus, Russia (Orel, Ural Mountains, Omsk, Altay, Tuva). China: Sinkiang. Mongolia.

LARVAL FOOD PLANTS: Stonecrop; *Sedum*, especially *S. album*, *S. telephium*, *S. purpurascens*, and *Sempervivum* (Higgins & Riley, 1970). *Sedum acre* (Rebel & Rogenhofer, 1893). *S. annuum*, *S. villosum* and *S. roseum* (Eisner, 1958). *S. maximum* (Holik, 1937).

Subsp. ***geminus*** Stichel (Switzerland: Grindelwald). Faintly yellowish, red spots smaller.

Subsp. ***bartholomaeus*** Stichel [Germany: Königsee]. Small, male heavily marked above.

Subsp. ***rhodopensis*** Markovic [Bulgaria: Rila Planina, Rhodopi Planina]. Very large.

Subsp. ***nevadensis*** Oberthür [Spain: Sierra Nevada]. Male above with yellow ocelli.

Subsp. ***sicilae*** Oberthür [Sicily]. Very small (Higgins & Riley, 1970).

THE MNEMOSYNE-GROUP

***Parnassius mnemosyne* (Linnaeus)**

(Pl. 4, figs 25, 26, Pl. 15, fig. 99, Text-fig. 32)

Papilio mnemosyne Linnaeus, 1758 : 465.

Parnassius mnemosyne (Linnaeus); Bryk, 1935 : 19.

Parnassius mnemosyne (Linnaeus); Eisner, 1966 : 142.

DISTRIBUTION. Finland. Sweden. Denmark (Baltic Islands). Germany. France. Spain. Switzerland. Italy. Austria. Poland. Czechoslovakia. Hungary. Yugoslavia. Rumania. Bulgaria. Albania. Greece. Turkey. Syria. Lebanon. Iraq. Iran. Afghanistan. U.S.S.R.: Estonia, Latvia, Lithuania, Ukraine, Uzbekistan, Tadzhikistan, Kirghizia, Russia (Mordov, Ural Mountains).

LARVAL FOOD PLANTS. *Corydalis* (Higgins & Riley, 1970). *C. cava* and *C. helleri* (Bryk, 1935). *C. solida* (Rebel & Rogenhofer, 1893). *C. parnanica* (Kolar, 1937). *C. intermedia* (Eisner, 1958).

***Parnassius stubbendorffii* Ménéttriés**

(Pl. 4, figs 27, 28)

Parnassius stubbendorffii Ménéttriés, 1849 : 273, pl. 6, fig. 2.

Parnassius stubbendorffii Ménéttriés; Bryk, 1935 : 107.

Parnassius stubbendorffii Ménéttriés; Eisner, 1966 : 179.

DISTRIBUTION. U.S.S.R.: Russia (Altay, Tuva, Buryat, Chita, Amur, Khabarovsk, Primorye, Sakhalin, Kurile Islands). Mongolia. Tibet. Korea. China: Heilungkiang, Kansu, Szechwan, Tsinghai. Japan: Hokkaido.

LARVAL FOOD PLANTS. *Corydalis ambigua*, *C. gigantaea* (Kurentsov, 1970). *Aristolochia debilis* (Lee, 1958).

***Parnassius glacialis* Butler**

(Pl. 4, figs 29, 30, Text-fig. 6)

Parnassius glacialis Butler, 1866 : 50.

Parnassius stubbendorffii glacialis Butler; Bryk, 1935 : 128.

Parnassius glacialis Butler; Eisner, 1966 : 117.

Parnassius glacialis Butler; Ackery, 1973 : 7.

DISTRIBUTION. Japan: Hokkaido, Honshu, Shikoku. Korea. China: Hupeh, Shantung, Kiangsu, Anhwei, Chekiang.

LARVAL FOOD PLANTS. *Corydalis incisa*, *C. ambigua*, *C. decumbens* and *C. remota* (Suguru Igarashi, in litt). *Aristolochia debilis* (Lee, 1958).

***Parnassius eversmanni* Ménéttriés**

(Pl. 4, figs 31, 32, Pl. 5, figs 33, 34)

Parnassius eversmanni Ménéttriés, 1855 : 73, pl. 1, fig. 2.

Parnassius eversmanni Ménéttriés; Hemming, 1934 : 199.

Parnassius eversmanni Ménéttriés; Bryk, 1935 : 133.

Parnassius eversmanni Ménéttriés; Eisner, 1966 : 108.

DISTRIBUTION. U.S.S.R.: Russia (Irkutsk, Buryat, Primorye, Khabarovsk, Tuva, Chita, Yakut, Magadan, Kamchatka, Yevrey). Mongolia. Japan: Hokkaido. U.S.A.: Alaska.

LARVAL FOOD PLANTS. *Corydalis gigantea* (Fumariaceae) (Wilson, 1961). *Dicentra peregrina* (Suguru Igarashi, in litt.).

Subsp. *felderi* Bremer [U.S.S.R.: Russia (Amur, Khabarovsk, Yevrey)].

Yellow pigment absent in male. Postdiscal and costal spots often black. Superficially similar to *glacialis* Butler.

***Parnassius nordmanni* (Nordmann)**

(Pl. 5, figs 35, 36)

- Doritis nordmanni* Nordmann, 1851 : 423, pl. 13, figs 1-3.
Parnassius nordmanni (Nordmann); Hemming, 1934 : 198.
Parnassius nordmanni Ménétriés; Bryk, 1935 : 146.
Parnassius nordmanni Ménétriés; Eisner, 1966 : 149.

DISTRIBUTION. U.S.S.R.: Caucasus.

***Parnassius ariadne* Lederer**

(Pl. 5, figs 37, 38)

- Doritis clarius* Eversmann, 1843 : 539, pl. 9, figs 1A, B, C (nec *clarius* Hübner, [1806] : 61, nota 6).
Parnassius ariadne Lederer, 1853 : 354.
Parnassius ariadne Lederer; Hemming, 1934 : 198.
Parnassius clarius (Eversmann); Bryk, 1935 : 151.
Parnassius clarius (Eversmann); Eisner, 1966 : 98.

DISTRIBUTION. U.S.S.R.: Russia (Altay), Tadzhikistan. Western Mongolia.

***Parnassius clodius* Ménétriés**

(Pl. 5, figs 39, 40)

- Parnassius clodius* Ménétriés, 1855 : 7.
Parnassius clodius Ménétriés; Bryk, 1935 : 156.
Parnassius clodius Ménétriés; Eisner, 1966 : 98.

DISTRIBUTION. U.S.A.: Alaska, Washington, Idaho, Montana, Wyoming, Oregon, Nevada. Canada: British Columbia.

LARVAL FOOD PLANTS. *Viola*, *Sedum* (Stonecrop), *Vaccinium?*, *Rubus?* (Wilson, 1961). *Saxifraga* sp., *Vitis californica* (Tietz, 1972).

***Parnassius orleans* Oberthür**

(Pl. 6, figs 41, 42, Text-fig. 27)

- Parnassius orleans* Oberthür, 1890 : 1.
Parnassius orleans Oberthür, 1891 : 8, 18, pl. 1, fig. 2.
Parnassius orleans Oberthür; Bryk, 1935 : 163.
Parnassius orleans Oberthür; Eisner, 1966 : 154.

DISTRIBUTION. Tibet. Mongolia. China: Sinkiang, Tsinghai, Kansu, Shensi, Szechwan, Yunnan.

THE *HARDWICKII*-GROUP*Parnassius hardwickii* Gray

(Pl. 6, figs 43, 44, Text-fig. 4)

Parnassius hardwickii Gray, 1831 : 32.*Lingamius hardwickei* (Gray); Bryk, 1935 : 541.*Lingamius hardwickei* (Gray); Eisner, 1966 : 120.

DISTRIBUTION. Kashmir. N. India. Nepal. Sikkim. Bhutan.

LARVAL FOOD PLANTS. Various species of Saxifrage (Moore, 1902).

Superficially similar to *orleans* Oberthür but normally distinguishable by the white-centred, blue, submarginal series of spots on the hindwing upperside.THE *SZECHENYII*-GROUP*Parnassius szechenyii* Frivaldszky

(Pl. 6, figs 45, 46, Pl. 15, fig. 100, Text-fig. 5)

Parnassius szechenyii Frivaldszky, 1886 : 39, pl. 4, figs 1, 1a.*Koramius szechenyii* (Frivaldszky); Bryk, 1935 : 550.*Koramius szechenyi* (Frivaldszky); Eisner, 1966 : 181.

DISTRIBUTION. Tibet. China: Tsinghai, Kansu, Szechwan, Yunnan.

Parnassius cephalus Grum-Grshimailo

(Pl. 6, figs 47, 48, Pl. 7, figs 49, 50, Text-fig. 22, 30)

Parnassius cephalus Grum-Grshimailo, 1891 : 446.*Koramius cephalus* (Grum-Grshimailo); Bryk, 1935 : 558.*Koramius cephalus* (Grum-Grshimailo); Eisner, 1966 : 97.

DISTRIBUTION. Tibet. China: Kansu, Szechwan, Tsinghai. Kashmir.

Subsp. *maharaja* Avinoff [Kashmir: Ladakh Range]. Markings generally reduced. Submarginal spots above faint, not centred with blue. Postdiscal and costal spots absent from hindwing upperside.This subspecies (Pl. 7, figs 49, 50), treated by both Bryk (1935) and Munroe (1960) as a species, differs from typical *cephalus* in having veins R_1 and R_2 consistently anastomosing, causing it to key out as *P. acco* Gray.THE *ACCO*-GROUP*Parnassius acco* Gray

(Pl. 7, figs 51, 52, 53, 54)

Parnassius acco Gray, 1853 : 76, pl. 12, figs 5, 6.*Tadumia acco* (Gray); Bryk, 1935 : 631.*Tadumia acco* (Gray); Eisner, 1966 : 82.

DISTRIBUTION. Kashmir. Tibet. Sikkim.

Subsp. *liliput* Bryk [Tibet: Everest District], subsp. *hunningtoni* Avinoff [Tibet: Dochar, Tuna, Tsangpo Valley, Dzara, Kyetrak, Chumbi Valley. Sikkim: Gangtok]. Smaller than the typical form, red markings absent.

THE *DELPHIUS*-GROUP

Parnassius patricius Niepelt

(Pl. 7, figs 55, 56)

Parnassius patricius Niepelt, 1911 : 274.

Koramius patricius (Niepelt); Bryk, 1935 : 568.

Koramius patricius (Niepelt); Eisner, 1966 : 155.

DISTRIBUTION. U.S.S.R.: Kirghizia.

Parnassius acdestis Grum-Grshimailo

(Pl. 8, figs 61, 62, Pl. 15, fig. 101, Text-fig. 7)

Parnassius delphi var. *acdestis* Grum-Grshimailo, 1891 : 446.

Koramius acdestis (Grum-Grshimailo); Bryk, 1935 : 572.

Koramius acdestis (Grum-Grshimailo); Eisner, 1966 : 82.

DISTRIBUTION. U.S.S.R.: Kirghizia. Kashmir. Tibet. Sikkim. Bhutan. China: Sinkiang, Szechwan.

The arrangement of the forewing radial veins is more variable in this species than in any other. Although veins R_1 and R_2 are usually separate, in many specimens they do appear to touch and in some cases quite definitely anastomose.

Subsp. *lucifer* Bryk [Sikkim: Gyamtshona]. Postdiscal and costal spots black in hindwing above.

Subsp. *lux* Eisner [Tibet: Jung-jung Khola]. Basal black scaling in hindwing above far less extensive than in the typical form. Postdiscal and costal spots large.

Parnassius delphi (Eversmann)

(Pl. 8, figs 57, 58, 59, 60, Pl. 15, fig. 102)

Doritis delphi Eversmann, 1843 : 541, pl. 7, figs 1a, b.

Parnassius delphi (Eversmann); Elwes, 1886 : 39.

Koramius delphi (Eversmann); Bryk, 1935 : 583.

Koramius delphi (Eversmann); Eisner, 1966 : 102.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan, Kirghizia, Uzbekistan. Pakistan. Kashmir. N. India. Tibet. China: Sinkiang, Tsinghai.

Highly variable species. Hindwing discal spots often without red scales.

Subsp. *pulchra* Eisner [Kirghizia: Kungey Alatau Mountains]. Wings exceptionally dark, semi-transparent.

Although treated by Bryk (1935) and Munroe (1960) as a distinct species, *Parnassius stoliczkanus* is here regarded, in accordance with Eisner (1966), as a subspecies of *Parnassius delphi* (Eversmann). The following subspecies are those that Bryk and Munroe would have included in *Parnassius stoliczkanus* Felder & Felder.

Subsp. *atkinsoni* Moore [Kashmir: Pir Pinjal, Sind Valley, Burzil Pass. India: Himachal Pradesh, Kulu], subsp. *beate* Eisner [Kashmir: Karakoram, Potu-la Pass, Chalsi, Leh], subsp. *chitralica* Verity [Pakistan: Chitral], subsp. *florentiae* Tytler [Tibet: Phupes Hundes, Tibu, Churmurti], subsp. *gracilis* Bryk & Eisner [India: Himachal Pradesh, Kangra, Rohtang Pass], subsp. *imitator* Bryk & Eisner [U.S.S.R.: Tadzhikistan, Pamirs, Beik Pass], subsp. *kumaonensis* Riley [India: Uttar Pradesh, Kumaon, Shillung], subsp. *nicevillei* Avinoff [Kashmir: Pir Pinjal, Burzil Pass, Sari Sungur Pass, Sapta La], subsp. *parangensis* Eisner [India: Himachal Pradesh, Parang Pass, Bara Lacha Pass. Kashmir: Tagalang Pass, Lingti, Ladahk], subsp. *rileyi* Tytler [Kashmir: Rupal Valley, Astor], subsp. *spitiensis* Bang-Haas [Tibet: Spiti, Tum-Tum-Thang, Churmurti], subsp. *stoliczkanus* Felder & Felder [Kashmir: Ladak, Rupshu, Sapta La], subsp. *tenuis* Bryk & Eisner [Kashmir: Gya-Ladahk, Tagalang Pass], subsp. *tytlerianus* Bryk & Eisner [Kashmir: Chitral, Bangol Pass], subsp. *zanskarica* Bang-Haas [Kashmir: Nira, Zanskar Mts.], subsp. *zogilaica* Tytler [Kashmir: Zogila]. Generally smaller than the typical *delphi*. Red costal spot of hindwing upperside usually absent.

THE *IMPERATOR*-GROUP

Parnassius imperator Oberthür

(Pl. 8, figs 63, 64, Pl. 15, fig. 103, Text-fig. 21)

Parnassius imperator Oberthür, 1883 : 77.

Tadumia imperator (Oberthür); Bryk, 1935 : 675.

Eukoramius imperator (Oberthür); Eisner, 1966 : 123.

DISTRIBUTION. Tibet. China: Tsinghai, Kansu, Szechwan, Yunnan.

LARVAL FOOD PLANT. *Corydalis* (Verity, 1907).

THE *CHARLTONIUS*-GROUP

Parnassius charltonius Gray

(Pl. 9, figs 65, 66, Pl. 15, fig. 104, Text-fig. 24)

Parnassius charltonius Gray, 1853 : 77, pl. 12, fig. 7.

Koramius charltonius (Gray); Bryk, 1935 : 694.

Koramius charltonius (Gray); Eisner, 1966 : 97.

DISTRIBUTION. Afghanistan. U.S.S.R.: Kirghizia, Tadzhikistan. Pakistan. Kashmir. N. India. Tibet.

LARVAL FOOD PLANT. *Corydalis gortschakovi* (A. Tsvetajev, pers. com.)

***Parnassius inopinatus* Kotsch**

(Pl. 9, figs 67, 68, Pl. 15, fig. 105)

Parnassius inopinatus Kotsch, 1940 : 17.

Kailasius inopinatus (Kotsch); Eisner, 1966 : 123.

DISTRIBUTION. Afghanistan: Firus-Kuhi Range, Koh-i-Baba Range.

***Parnassius loxias* Püngeler**

(Pl. 9, figs 69, 70)

Parnassius loxias Püngeler, 1901 : 178, pl. 1, figs 5, 6.

Koramius loxias (Püngeler); Bryk, 1935 : 717.

Eukoramius loxias (Püngeler); Eisner, 1966 : 132.

DISTRIBUTION. U.S.S.R.: Kirghizia. China: Sinkiang.

***Parnassius autocrator* Avinoff**

(Pl. 9, figs 71, 72, Text-fig. 28)

Parnassius charltonius autocrator Avinoff, 1913 : 16, pl. 2, fig. 2.

Koramius charltonius autocrator (Avinoff); Bryk, 1935 : 716.

Eukoramius autocrator (Avinoff); Eisner, 1966 : 91.

DISTRIBUTION. Afghanistan. U.S.S.R.: Tadzhikistan.

LARVAL FOOD PLANT. *Corydalis adiantifolia* (Wyatt & Omoto, 1963).

THE *TENEDIUS*-GROUP

***Parnassius tenedius* Eversmann**

(Pl. 10, figs 75, 76, Text-fig. 3)

Parnassius tenedius Eversmann, 1851 : 621.

Tadumia tenedius (Eversmann); Bryk, 1935 : 647.

Tadumia tenedius (Eversmann); Eisner, 1966 : 181.

DISTRIBUTION. Mongolia. U.S.S.R.: Russia (Yakut, Tuva, Chita). China: Inner Mongolia.

LARVAL FOOD PLANT. *Corydalis* sp. (*bracteata*?)(A. Tsvetajev, pers. com.).

THE *SIMO*-GROUP

***Parnassius simo* Gray**

(Pl. 10, figs 73, 74, Text-fig. 8)

Parnassius simo Gray, 1853 : 76.

Tadumia simo (Gray); Bryk, 1935 : 654.

Tadumia simo (Gray); Eisner, 1966 : 178.

DISTRIBUTION. U.S.S.R.: Kirghizia, Tadzhikistan. Kashmir. N. India. Mongolia. Tibet. China: Sinkiang, Kansu.

Tribe ZERYNTHIINI

Zerynthianae Grote, 1899 : 17. Type-genus: *Zerynthia* Ochsenheimer.

SERICINUS Westwood

Sericinus Westwood, 1851 : 173. Type-species: *Papilio telamon* Donovan, by original designation.

Sericinus Westwood; Bryk, 1934 : 77.

Sericinus Westwood; Munroe, 1960 : 13.

Sericinus montela Gray

(Pl. 10, figs 77, 78, Text-figs 16, 26)

Papilio telamon Donovan, 1798 : pl. 27, fig. 1. [Junior homonym of *Papilio telamon* Linnaeus, 1758 : 486.]

Sericinus montela Gray, 1853 : 78, pl. 13, figs 1, 2.

Sericinus telamon (Donovan); Bryk, 1934 : 80.

Sericinus telamon montela Gray; Bryk, 1934 : 89.

Sericinus montela Gray; Eisner, 1966 : 142.

Sericinus telamon (Donovan); Eisner, 1966 : 181.

Sericinus montela Gray; Hemming, 1967 : 409.

DISTRIBUTION. China: Heilungkiang, Kirin, Liaoning, Hopei, Shangtung, Anhwei, Kiangsu, Hunan, Hupeh, Kiangsi, Kansu. Korea.

LARVAL FOOD PLANTS. *Aristolochia* (Leech, 1893 : 488). *A. contorta* (Kurentsov, 1970).

PARNALIUS Rafinesque

Thais Fabricius, 1807 : 283. Type-species: *Papilio hypsipyle* Fabricius, by monotypy. [Junior homonym of *Thais* Röding, 1789.]

Parnalius Rafinesque, 1815 : 128. [Replacement name for *Thais* Fabricius.]

Zerynthia Ochsenheimer, 1816 : 29. [Replacement name for *Thais* Fabricius.]

Eugraphis Billberg, 1820 : 75. Type-species: *Papilio hypsipyle* Fabricius, by monotypy.

Parnalius Rafinesque; Sherborn, 1929 : 4765.

Zerynthia Ochsenheimer; Sherborn, 1932 : 7041.

Allancastris Bryk, 1934 : 19, 61-62. Type-species: *Thais cerisy* Godart, by original designation.

Syn. n.

Zerynthia Ochsenheimer; Bryk, 1934 : 31.

Parnalius Rafinesque; Neave, 1940a : 614.

Zerynthia Ochsenheimer; Neave, 1940b : 689.

Allancastris Bryk; Munroe, 1960 : 10.

Zerynthia Ochsenheimer; Munroe, 1960 : 13.

Zerynthia Ochsenheimer; Hemming, 1967 : 464.

Parnalius Rafinesque; Cowan, 1970 : 11. [*Zerynthia* Ochsenheimer cited as synonym.]

According to Cowan (1970) Rafinesque introduced the name *Parnalius* for *Thais* Fabricius, which was invalid as a junior homonym. The name is available and valid, and is a senior objective synonym of *Zerynthia* Ochsenheimer, 1816. It has been correctly listed by both Sherborn (1929) and Neave (1940).

The genus *Allancastris* Bryk is here treated as a synonym of *Parnalius* Rafinesque. The differences in venation, as figured by Bryk (1934), do not appear to be consistent although the genitalia are certainly distinct. If *Allancastris* Bryk is to be recognized as a valid genus it would seem to me that there is equal justification for raising the status of the species groups of *Parnassius* to genera. In order to maintain consistency in approach I am regarding *Allancastris* Bryk and *Parnalius* Rafinesque as being subjectively synonymous.

KEY TO THE SPECIES OF *PARNALIUS* RAFINESQUE

- 1 Cell 2*A* of forewing underside uniformly scaled, without distinct red or black discal spot; uncus long, bifid; clasper narrow (Text-fig. 11, Pl. 10, figs 79, 80) *cerisy* (Godart) (p. 91)
- Cell 2*A* of forewing underside with a distinct red or black discal spot; uncus short, bifid; clasper broad (Text-figs 9, 10) 2
- 2 (1) Forewing upperside usually with distinct red spots in the discal cell and with a vitreous spot near the wing apex; uncus in dorsal aspect narrowing towards the base; clasper distinctly produced dorso-posteriorly (Text-fig. 10, Pl. 11, figs 83, 84) *rumina* (Linnaeus) (p. 92)
- Forewing upperside usually with black spots in the discal cell, seldom red, and vitreous spot absent from the wing apex; uncus in dorsal aspect narrowing towards the apex; clasper slightly produced dorso-posteriorly (Text-fig. 9, Pl. 11, figs 81, 82) *polyxena* (Denis & Schiffermüller) (p. 91)

Parnalius cerisy (Godart) **comb. n.**

(Pl. 10, figs 79, 80, Text-figs 11, 17)

Thais cerisy Godart, [1824] : 812.

Zerynthia cerisyi (Godart); Stichel, 1907a : 82.

Allancastris cerisyi (Godart); Bryk, 1934 : 63.

Allancastris cerisy (Godart); Cowan, 1970 : 17, 41.

DISTRIBUTION. Cyprus. Crete. Greece. Yugoslavia. Bulgaria. Rumania. Albania. Turkey. U.S.S.R.: Armenia. Iran. Iraq. Syria. Israel. Lebanon.

LARVAL FOOD PLANTS: *Aristolochia clematis* and *A. hastata* (Bryk, 1934). *A. maurorum* (Suguru Igarashi, in litt.).

Parnalius polyxena (Denis & Schiffermüller) **comb. n.**

(Pl. 11, figs 81, 82, Text-figs 9, 19)

Papilio hypermnestra Scopoli, 1763 : 149, pl. [17], fig. 425. [Junior homonym of *Papilio hypermnestra* Linnaeus, 1763 : 40.]

Papilio polyxena Denis & Schiffermüller, 1775 : 162.

Papilio hypsipyle Fabricius, 1777 : 265.

Zerynthia hypermnestra (Scopoli); Bryk, 1934 : 34.

Zerynthia hypermnestra (Scopoli); Eisner, 1966 : 123.

Zerynthia polyxena (Denis & Schiffermüller); Hemming, 1967 : 436.

Hemming (1967) gives a detailed explanation of the nomenclatorial history of this species and how *polyxena* was finally established as the valid name.

DISTRIBUTION. S. France. Austria. Italy. Sicily. Yugoslavia. Hungary. Rumania. Albania. Greece. Czechoslovakia.

LARVAL FOOD PLANTS. *Aristolochia pistolochia*. *A. rotunda* and *A. clematis* (Higgins & Riley, 1970). *A. sicula* (Bryk, 1934).

Parnalius rumina (Linnaeus) **comb. n.**

(Pl. II, figs 83, 84, Text-fig. 10)

Papilio rumina Linnaeus, 1758 : 480.

Thais maturna Butler, 1870 : 232.

Zerynthia rumina (Linnaeus); Bryk, 1934 : 50.

DISTRIBUTION. S. France. Spain. Portugal. Algeria. Morocco. Tunisia.

LARVAL FOOD PLANTS. Various kinds of *Aristolochia* (Higgins & Riley, 1970). *A. pistolochia* and *A. fontanesi* (Bryk, 1934).

LUEHDORFIA Crüger

Luehdorfia Crüger, 1878 : 128. Type-species: *Luehdorfia eximia* Crüger, by monotypy.

Luehdorfia Crüger; Bryk, 1934 : 99.

Luehdorfia Crüger; Munroe, 1960 : 13.

KEY TO THE SPECIES OF *LUEHDORFIA* CRÜGER

- 1 Claspers of male covered with thick golden brown pubescence; ventral spinose setae, placed internally on claspers, elongate (Text-fig. 12); sphragis of female keeled (Pl. II, figs 85, 86) ***puziloi*** (Erschoff) (p. 92)
- Claspers of male covered with thick black pubescence; ventral setae, placed internally on claspers, shorter (Text-fig. 13); sphragis of female without keel (Pl. II, figs 87, 88, 89, 90) ***japonica*** Leech (p. 93)

Luehdorfia puziloi (Erschoff)

(Pl. II, figs 85, 86, Text-fig. 12)

Thais puziloi Erschoff, 1872 : 315.

Luehdorfia eximia Crüger, 1878 : 128.

Luehdorfia puziloi (Erschoff); Bryk, 1934 : 102.

DISTRIBUTION. U.S.S.R.: Russia (Primorye). Korea. Japan: Hokkaido, Honshu.

LARVAL FOOD PLANTS. *Asarum* (Graeser, 1888). *A. sieboldi* (Kurentsov, 1970).

***Luehdorfia japonica* Leech**

(Pl. II, figs 87, 88, 89, 90, Text-figs 13, 23)

Luehdorfia japonica Leech, 1889 : 25, pl. I, figs 1, 1b, 1c.

Luehdorfia japonica japonica Leech; Bryk, 1934 : 102.

DISTRIBUTION. Japan: Honshu. Taiwan. China: Liaoning, Kirin, Hupeh, Anhwei, Kiangsu, Kiangsi.

LARVAL FOOD PLANTS. *Asarum nipponicum*, *A. tamaense*, *A. blumei*, *A. caulescens* and *A. sieboldi* (Suguru Igarashi, in litt.).

Subsp. ***chinensis*** Leech (China: Hupeh, Anhwei, Kiangsu, Kiangsi). Hindwing upperside with red submarginal band. Internervular marginal spots of hindwing yellow.

The latter taxon, variously treated by authors, was regarded by Bryk (1934) as a subspecies of *puziloi* Erschoff. The male genitalia, however, show a close resemblance to those of *japonica* Leech both in the shape of the claspers and in the length of the setae placed internally thereon. These characters, together with the unkeeled sphragis of the female, seem to indicate that this taxon was correctly placed by Rothschild (1918) as a subspecies of *japonica* Leech, and it is here so treated.

***BHUTANITIS* Atkinson**

Armandia Blanchard, 1871 : 809, nota 3. Type-species: *Armandia thaidina* Blanchard, by monotypy. [Homonym of *Armandia* Filippi, 1862.]

Bhutanitis Atkinson, 1873 : 570. Type-species: *Bhutanitis lidderdalii* Atkinson, by monotypy.

Bhutanitis Atkinson; Bryk, 1934 : 113.

Bhutanitis Atkinson; Munroe, 1960 : 13.

KEY TO THE SPECIES OF *BHUTANITIS* ATKINSON

- 1 Hindwing upperside with a series of orange marginal internervular markings 2
- Hindwing upperside without orange marginal internervular markings, being yellow or grey in these areas 3
- 2 (1) Vein M_3 of hindwing produced to broad spatulate tail; clasper of male bluntly produced posteriorly and bearing a tuft of thick black pubescence (Text-fig. 14, Pl. 12, figs 92, 93) ***thaidina*** (Blanchard) (p. 93)
- Vein M_3 of hindwing produced to a narrow tail; clasper of male pointed and bearing sparse pubescence only (Text-fig. 15, Pl. 13, figs 94, 95) ***lidderdalii*** Boisduval (p. 94)
- 3 (1) Vein Cu_{1b} of hindwing produced to a round lobe; pale bands of wings broad, resembling *Luehdorfia*; female bearing a sphragis (Pl. 12, fig. 91) ***mansfieldi*** (Riley) (p. 94)
- Vein Cu_{1b} of hindwing produced to a distinct tail; pale bands of wings narrow; female without sphragis (Pl. 14, figs 96, 97) ***ludlowi*** Gabriel (p. 94)

***Bhutanitis thaidina* (Blanchard)**

(Pl. 12, figs 92, 93, Text-figs 14, 25)

Armandia thaidina Blanchard, 1871 : 809.

Bhutanitis thaidina (Blanchard); Bryk, 1934 : 116.

DISTRIBUTION. China: Shensi, Szechwan, Yunnan.

LARVAL FOOD PLANT. *Aristolochia* sp. (Bryk, 1934).

***Bhutanitis lidderdalii* Atkinson**

(Pl. 13, figs 94, 95, Text-fig. 15)

Bhutanitis lidderdalii Atkinson, 1873 : 570, pl. 50.

Bhutanitis lidderdalii Atkinson; Bryk, 1934 : 118.

DISTRIBUTION. Bhutan. Sikkim. N. India: Assam, Nagaland, Manipur. N. Burma. China: Szechwan, Yunnan.

***Bhutanitis ludlowi* Gabriel**

(Pl. 14, figs 96, 97)

Bhutanitis ludlowi Gabriel, 1942 : 189.

DISTRIBUTION. Bhutan: Trashiyangsi Valley.

As far as I am aware, the type-series of *ludlowi* Gabriel is unique, no other representatives of this species being known to me.

***Bhutanitis mansfieldi* (Riley)**

(Pl. 12, fig. 91)

Armandia mansfieldi Riley, 1939a : 207, pl. 4.

Bhutanitis mansfieldi (Riley); Riley, 1939b : 267.

DISTRIBUTION. China: Yunnan.

This species, known to me from the female holotype only, bears a curious resemblance to *Luehdorfia* Crüger in both pattern and wing shape; furthermore it is the only *Bhutanitis* species in which the female bears a sphragis. When more material becomes available, examination of the male genitalia may show whether it has been correctly placed here.

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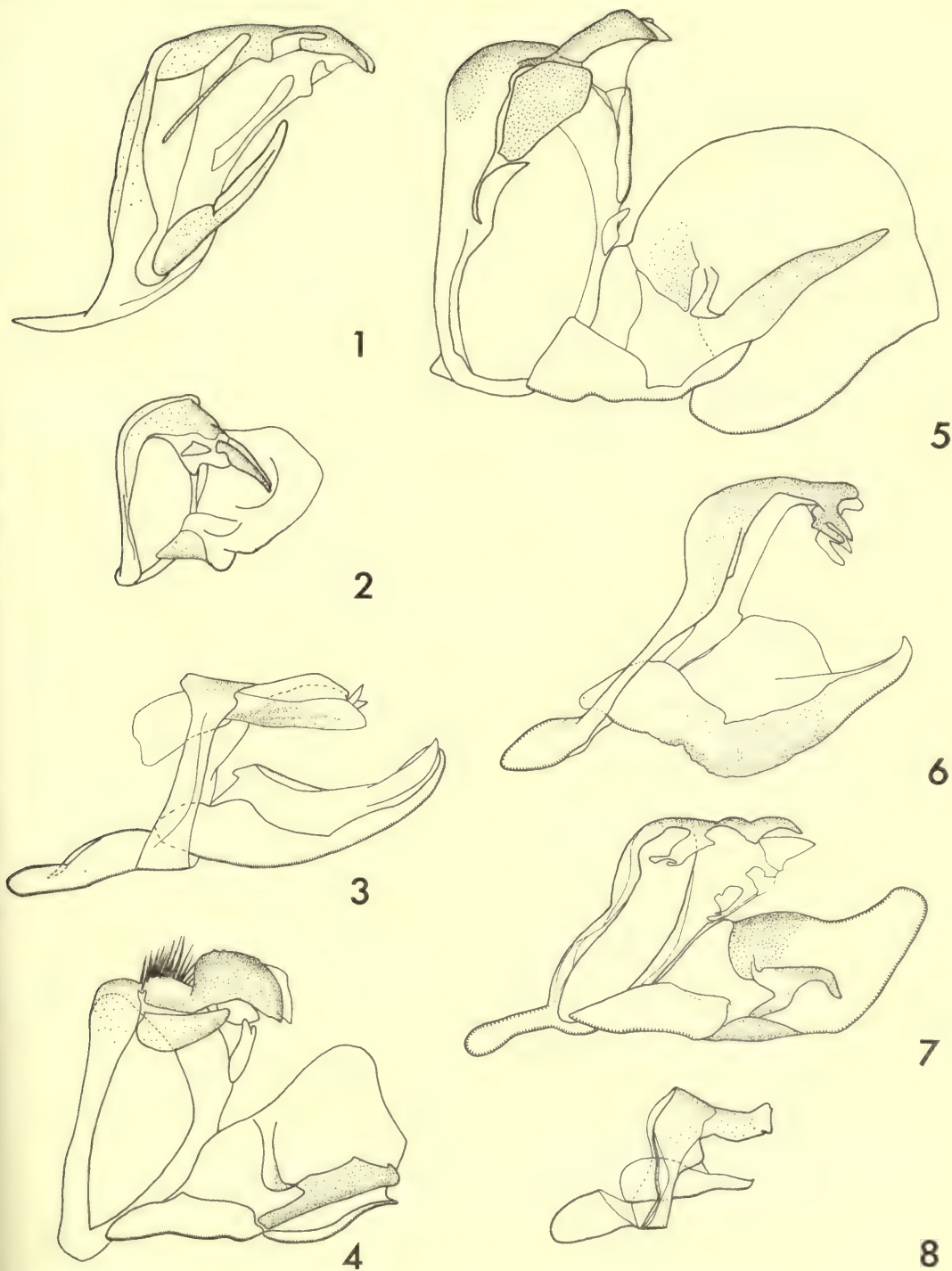
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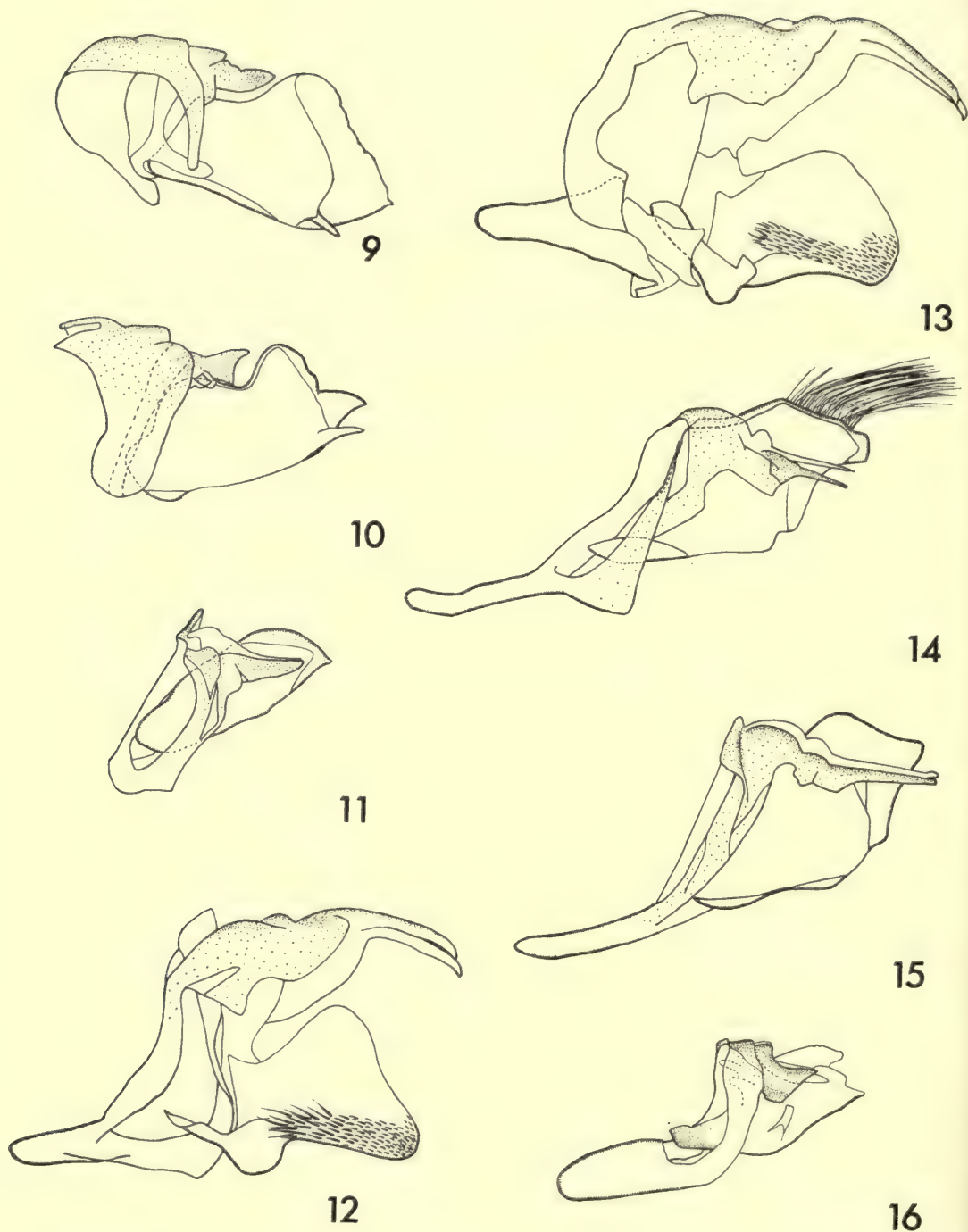
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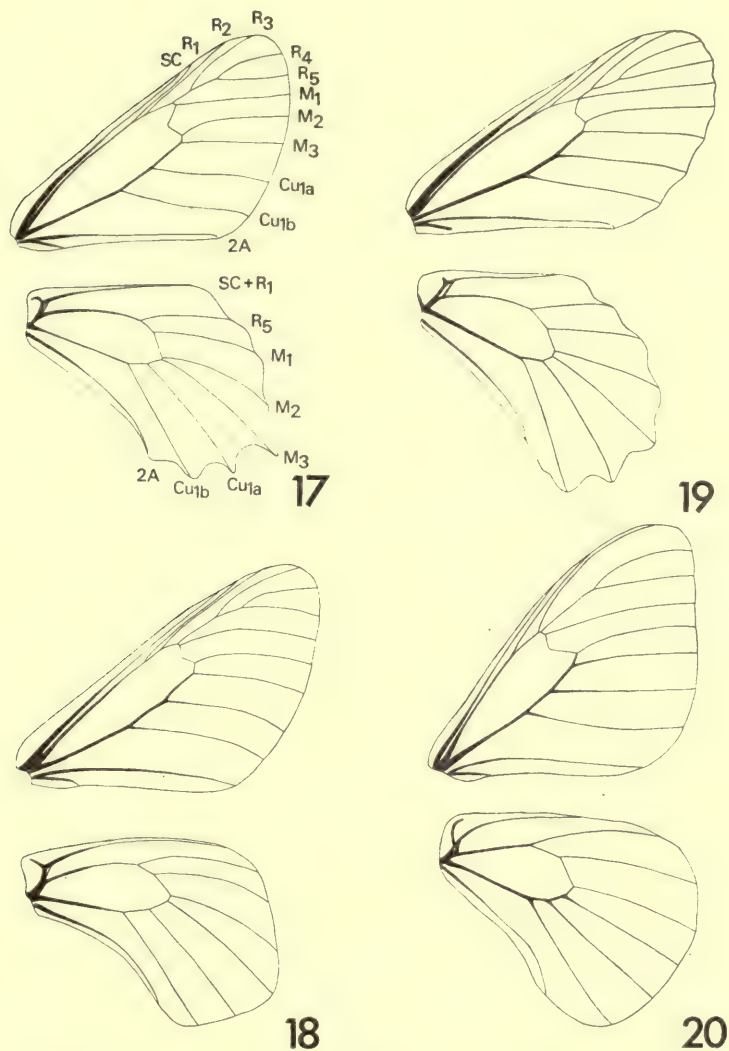
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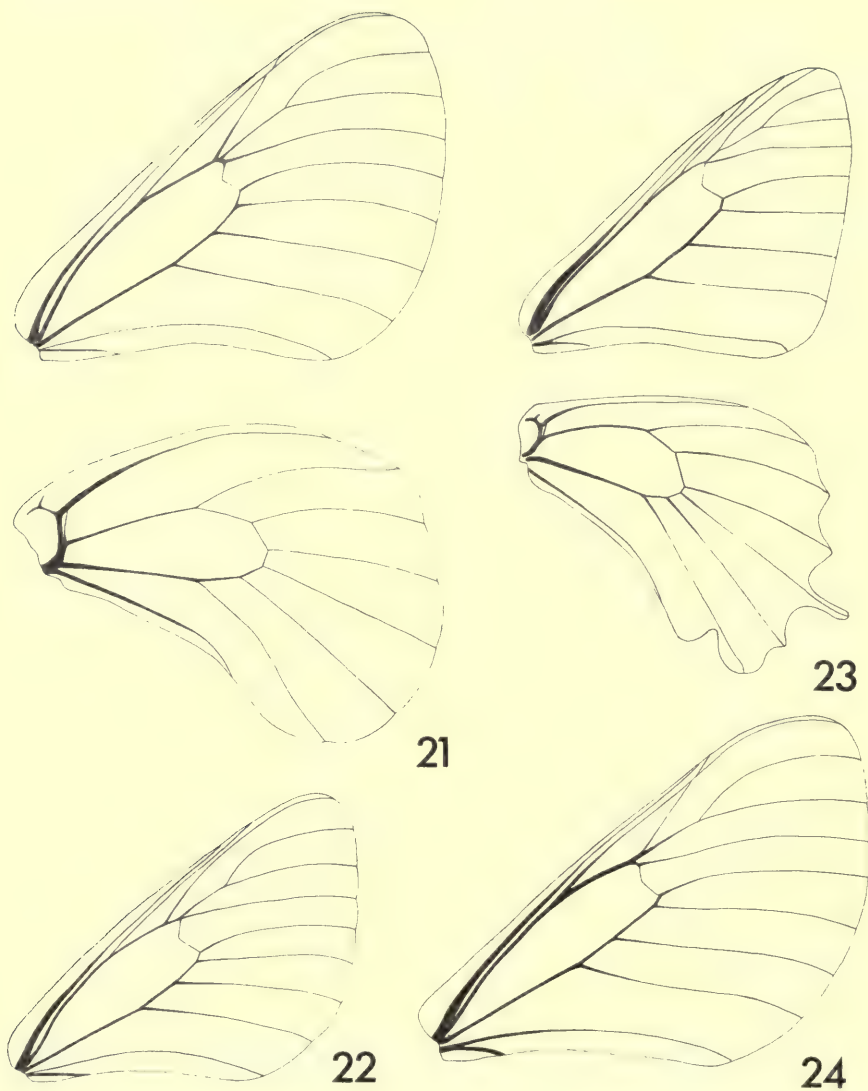
FIGS 1-8. Male genitalia, left clasper removed. 1, *Archon apollinus amasinus* (Staudinger & Rebel). 2, *Hypermnestra helios maxima* Grum-Grshimailo. 3, *Parnassius tenedius tenedius* Eversmann. 4, *P. hardwickii hardwickii* Gray. 5, *P. szechenyii szechenyii* Frivaldsky. 6, *P. glacialis glacialis* Butler. 7, *P. acestis lathonius* Bryk. 8, *P. simonius* Staudinger.



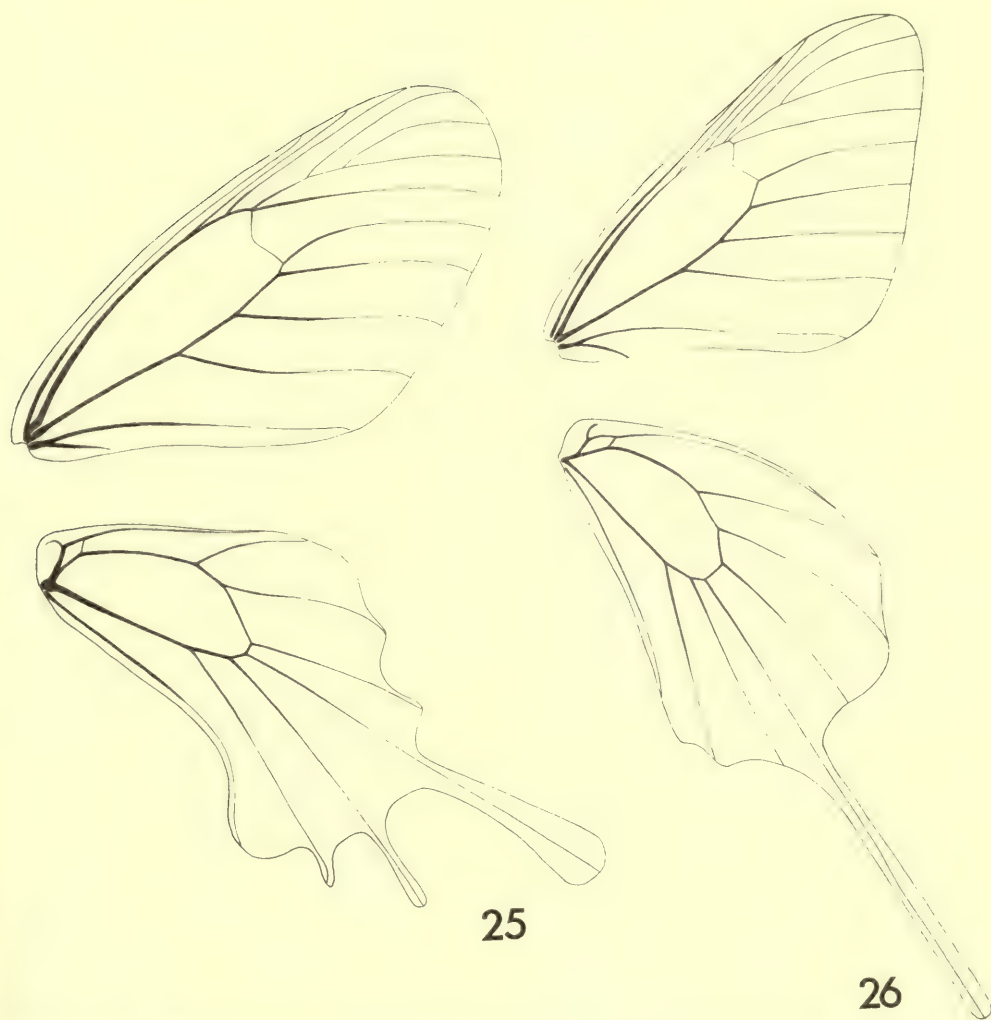
FIGS 9-16. Male genitalia, left clasper removed. 9, *Parnalius polyxena polyxena* (Denis & Schiffermüller). 10, *P. rumina australis* (Esper). 11, *P. cerisy speciosa* (Stichel). 12, *Luehdorfia puziloi puziloi* (Erschoff). 13, *L. japonica japonica* Leech. 14, *Bhutaniitis thaidina thaidina* (Blanchard). 15, *B. lidderdalii lidderdalii* Atkinson. 16, *Sericinus montela magnus* Fruhstorfer.



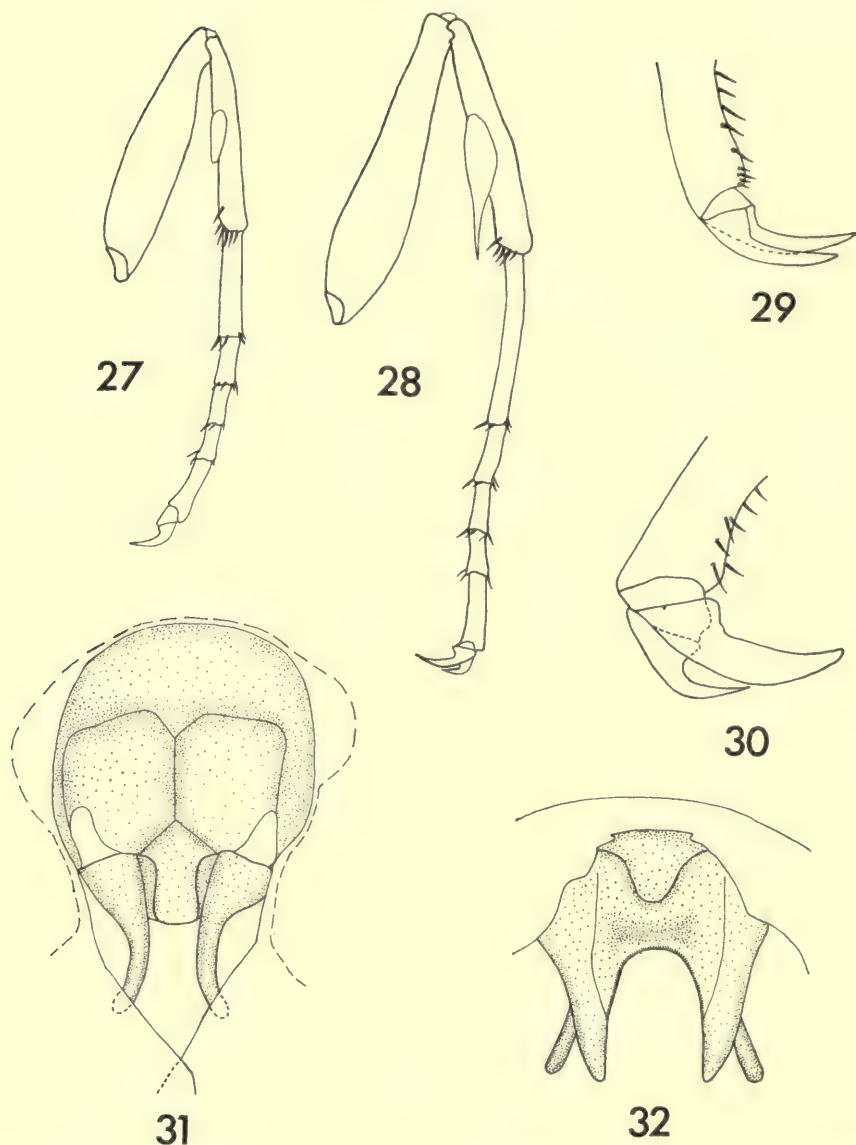
FIGS 17-20. Venation of right fore- and hindwings. 17, *Parnalius cerisy speciosa* (Stichel). 18, *Archon apollinus amasina* (Staudinger & Rebel). 19, *Parnalius polyxena polyxena* (Denis & Schiffermüller). 20, *Hypermnestra helios maxima* Grun-Grshimailo.



FIGS 21-24. Venation of right fore- and hindwings. 21, *Parnassius imperator imperator* Oberthür. 22, *P. cephalus ares* Bryk & Eisner [forewing only]. 23, *Luehdorfia japonica japonica* Leech. 24, *Parnassius charltonius deckerti* Verity [forewing only].



FIGS 25-26. Venation of right fore and hindwings. 25, *Bhutanitis thaidina thaidina* (Blanchard). 26, *Sericinus montela magnus* Fruhstorfer.



FIGS 27-32. 27-28, forelegs, showing foretibial epiphysis of (27) *Parnassius orleans* Oberthür, (28) *P. autocrator* Avinoff. 29-30. Male tarsal claws of forelegs of (29) *Hypermnestra helios* (Nickerl), (30) *Parnassius cephalus* Grum-Grshimailo. 31-32. Dorsal view of uncus of (31) *P. phoebus* (Fabricius), (32) *P. mnemosyne* (Linnaeus).

INDEX

Synonyms are in *italics*.

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- apollo, 83
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PLATE 1

Upper- and undersides (natural size)

Archon Hübner

FIG. 1. *apollinus apollinus* (Herbst) ♂ (Turkey: Taurus Mts)

FIG. 2. *apollinus apollinus* (Herbst) ♀ (Turkey: Taurus Mts)

Hypermnestra Ménétriés

FIG. 3. *helios maxima* Grum-Grshimailo ♂ (U.S.S.R.: Uzbekistan, Buchara)

FIG. 4. *helios maxima* Grum-Grshimailo ♀ (U.S.S.R.: Uzbekistan, Buchara)

Parnassius Latreille

FIG. 5. *apollonius narynus* Fruhstorfer ♂ (U.S.S.R.: Kirghizia, Fort Naryn)

FIG. 6. *apollonius narynus* Fruhstorfer ♀ (U.S.S.R.: Kirghizia, Fort Naryn)

FIG. 7. *honrathi honrathi* Staudinger ♂ (U.S.S.R.: Tadzhikistan, Hasret Sultan mont)

FIG. 8. *honrathi honrathi* Staudinger ♀ (U.S.S.R.: Tadzhikistan, Hasret Sultan mont)

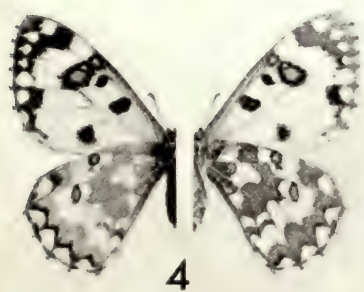


PLATE 2

Upper- and undersides (natural size)

Parnassius Latreille

- FIG. 9. *bremeri bremeri* Bremer ♂ (China-U.S.S.R.: Amur)
FIG. 10. *bremeri bremeri* Bremer ♀ (China-U.S.S.R.: Amur)
FIG. 11. *phoebus sacerdos* Vorbrodt ♂ (Switzerland: St Moritz)
FIG. 12. *phoebus sacerdos* Vorbrodt ♀ (Switzerland: San Bernhardino)
FIG. 13. *actius actius* (Eversmann) ♂ (China-U.S.S.R.: Borokhoro Mts)
FIG. 14. *actius actius* (Eversmann) ♀ (China-U.S.S.R.: Tien Shan)
FIG. 15. *jacquemontii baroghila* Tytler ♂ (Pakistan: Chitral)
FIG. 16. *jacquemontii baroghila* Tytler ♀ (Pakistan: Chitral)

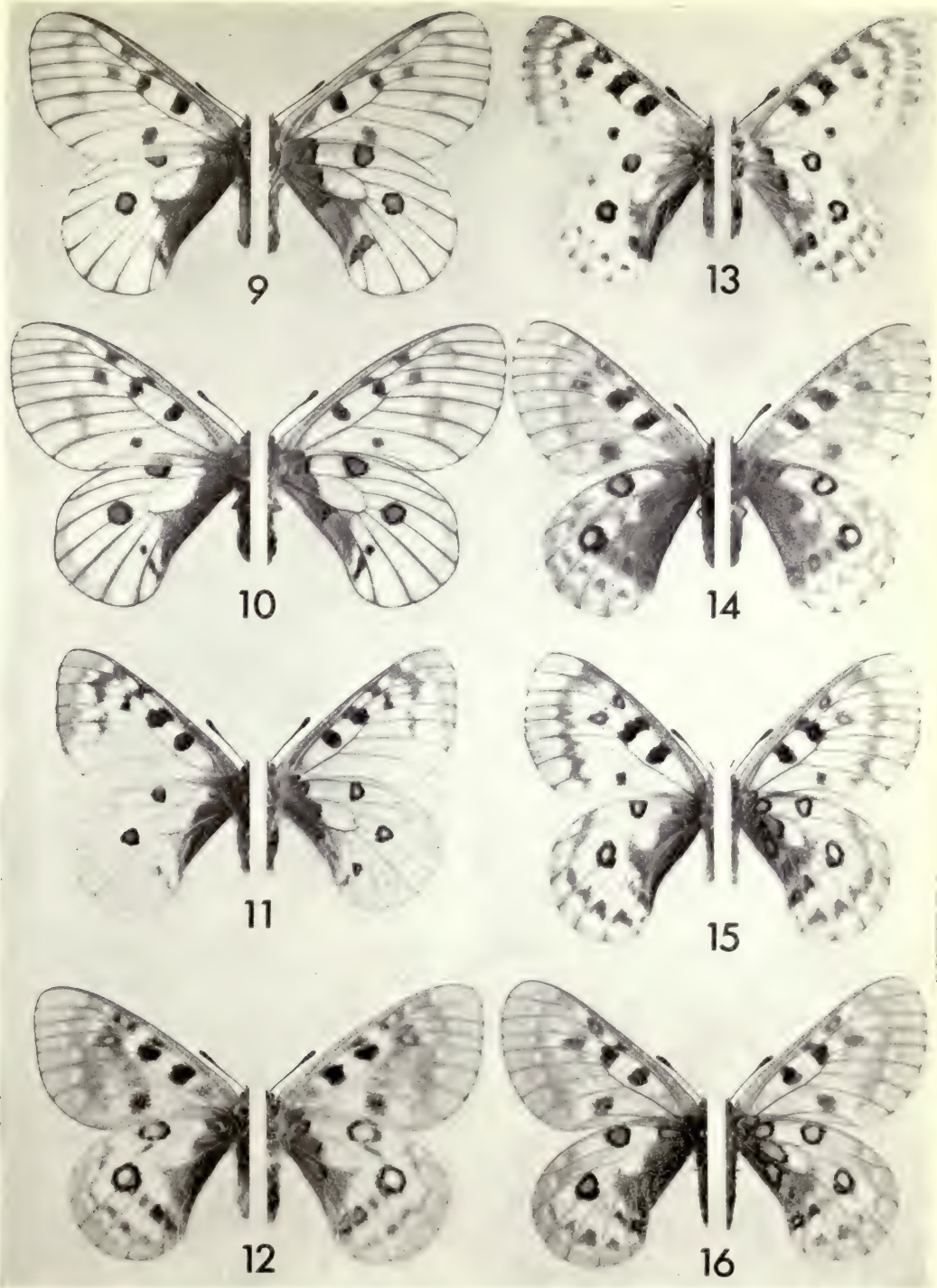


PLATE 3

Upper- and undersides (natural size)

Parnassius Latreille

- FIG. 17. *nomion dis* Bryk & Eisner ♂ (U.S.S.R.: Irkutsk)
FIG. 18. *nomion dis* Bryk & Eisner ♀ (U.S.S.R.: Irkutsk)
FIG. 19. *epaphus sikkimensis* Elwes ♂ (S. Tibet: Mago)
FIG. 20. *epaphus sikkimensis* Elwes ♀ (S. Tibet)
FIG. 21. *tianschanicus tianschanicus* Oberthür ♂ (U.S.S.R.: Turkestan)
FIG. 22. *tianschanicus tianschanicus* Oberthür ♀ (U.S.S.R.: Turkestan)
FIG. 23. *apollo apollo* (Linnaeus) ♂ (Sweden)
FIG. 24. *apollo apollo* (Linnaeus) ♀ (Sweden)

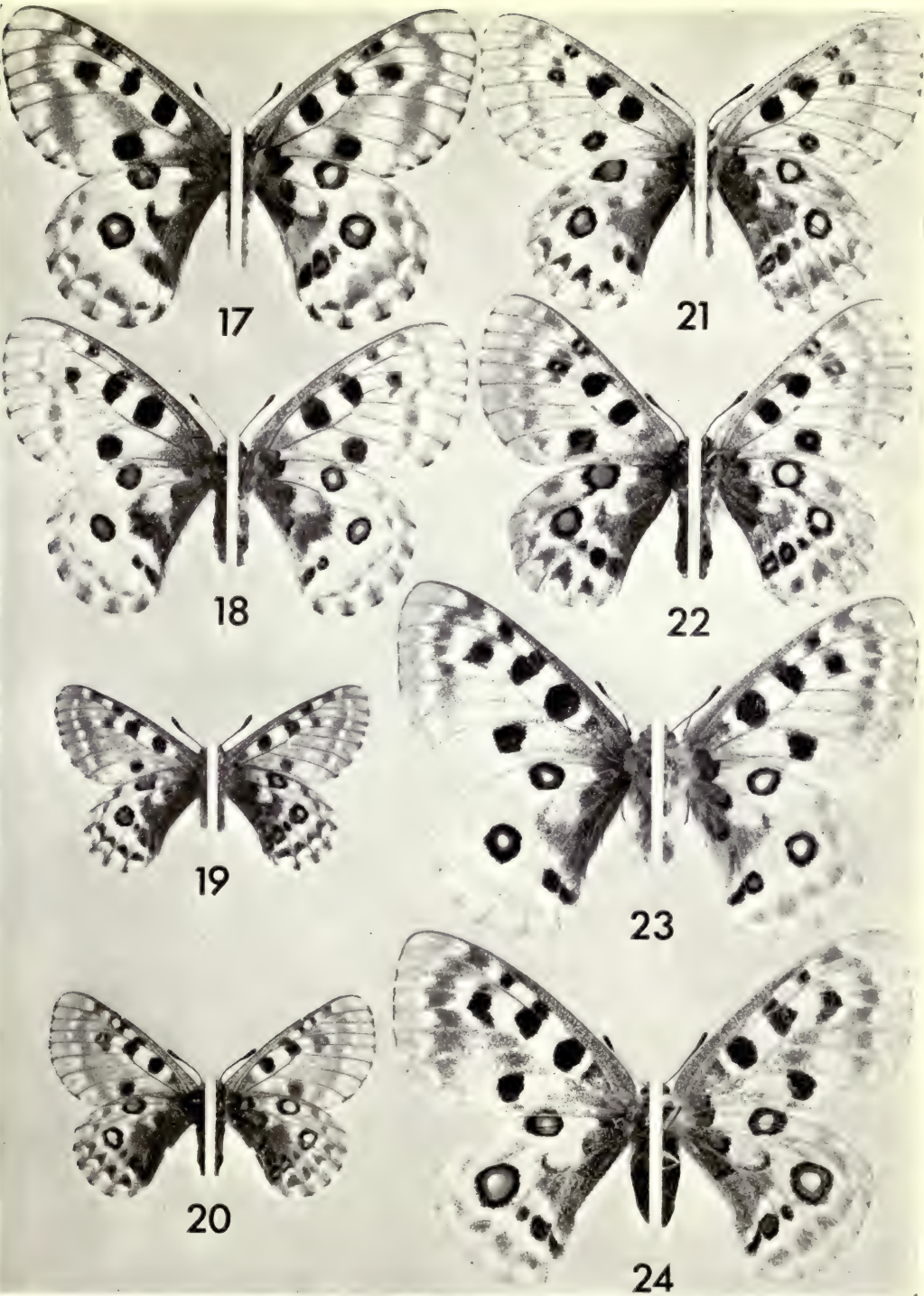


PLATE 4

Upper- and undersides (natural size)

Parnassius Latreille

- FIG. 25. *mnemosyne similis* Bryk & Eisner ♂ (Hungary)
FIG. 26. *mnemosyne similis* Bryk & Eisner ♀ (Hungary)
FIG. 27. *stubbendorffii stubbendorffii* Ménétériés ♂ (U.S.S.R.: Russia, Buryat, Sajan)
FIG. 28. *stubbendorffii stubbendorffii* Ménétériés ♀ (U.S.S.R.: Russia, Buryat, Sajan)
FIG. 29. *glacialis glacialis* Butler ♂ (Japan: Hokkaido, Sapporo)
FIG. 30. *glacialis glacialis* Butler ♀ (Japan: Hokkaido, Yesso)
FIG. 31. *eversmanni felderi* Bremer ♂ (U.S.S.R.: Russia, Yevrey, Pompejefka)
FIG. 32. *eversmanni felderi* Bremer ♀ (U.S.S.R.: Russia, Yevrey, Radde)



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PLATE 5

Upper- and undersides (natural size)

Parnassius Latreille

- FIG. 33. *eversmanni eversmanni* Ménéttriés ♂ (U.S.S.R.: Russia, Buryat, Sajan)
FIG. 34. *eversmanni eversmanni* Ménéttriés ♀ (U.S.S.R.: Russia, Buryat, Sajan)
FIG. 35. *nordmanni nordmanni* (Nordmann) ♂ (Caucasus)
FIG. 36. *nordmanni nordmanni* (Nordmann) ♀ (Caucasus, Adshara Mts)
FIG. 37. *ariadne ariadne* Lederer ♂ (U.S.S.R.-Mongolia: Altai)
FIG. 38. *ariadne ariadne* Lederer ♀ (U.S.S.R.: Turkestan)
FIG. 39. *clodius clodius* Ménéttriés ♂ (U.S.A.: West Washington)
FIG. 40. *clodius clodius* Ménéttriés ♀ (U.S.A.: Oregon)



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PLATE 6

Upper- and undersides (natural size)

Parnassius Latreille

- FIG. 41. *orleans orleans* Oberthür ♂ (China: Szechwan, How-Kow)
FIG. 42. *orleans orleans* Oberthür ♀ (China: Szechwan, How-Kow)
FIG. 43. *hardwickii hardwickii* Gray ♂ (N. India: Almora)
FIG. 44. *hardwickii hardwickii* Gray ♀ (Nepal: Jargeng Khola)
FIG. 45. *szechenyii szechenyii* Frivaldsky ♂ (China: Tsinghai, Kuku-Nor)
FIG. 46. *szechenyii szechenyii* Frivaldsky ♀ (Tibet: Amdo)
FIG. 47. *cephalus ares* Bryk & Eisner ♂ (China: Kansu)
FIG. 48. *cephalus ares* Bryk & Eisner ♀ (China: Kansu)



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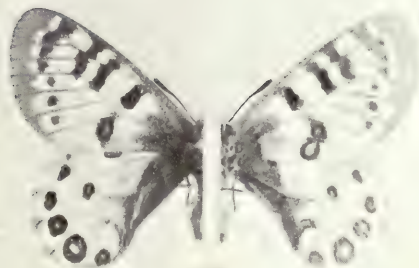
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PLATE 7

Upper- and undersides (natural size)

Parnassius Latreille

- FIG. 49. *cephalus maharaja* Avinoff ♂ (Kashmir: Ladakh)
FIG. 50. *cephalus maharaja* Avinoff ♀ (Kashmir: Ladakh)
FIG. 51. *acco tagalangi* Bang-Haas ♂ (Kashmir: Ladakh)
FIG. 52. *acco tagalangi* Bang-Haas ♀ (Kashmir: Ladakh)
FIG. 53. *acco hunnyngtoni* Avinoff ♂ (Tibet: Kyetrak)
FIG. 54. *acco hunnyngtoni* Avinoff ♀ (Tibet: Chumbi Valley)
FIG. 55. *patricius kardakoffi* Bryk & Eisner ♂ (U.S.S.R.: Kirghizia, Kungei-Ala-Tau)
FIG. 56. *patricius kardakoffi* Bryk & Eisner ♀ (U.S.S.R.: Kirghizia, Kungei-Ala-Tau)



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PLATE 8

Upper- and undersides (natural size)

Parnassius Latreille

- FIG. 57. *delphiuss albulus* Honrath ♂ (China: Sinkiang, Tien Shan)
FIG. 58. *delphiuss albulus* Honrath ♀ (China: Sinkiang, Tien Shan)
FIG. 59. *delphiuss beate* Eisner ♂ (Kashmir: Potu-la Pass)
FIG. 60. *delphiuss beate* Eisner ♀ (Kashmir: Chalsi)
FIG. 61. *acdestis acdestis* Grum-Grshimailo ♂ (Tibet: Amdo)
FIG. 62. *acdestis acdestis* Grum-Grshimailo ♀ (Tibet: Amdo)
FIG. 63. *imperator imperator* Oberthür ♂ (China: Szechwan, Ta-tsien-lou)
FIG. 64. *imperator imperator* Oberthür ♀ (China: Szechwan, Ta-tsien-lou)



PLATE 9

Upper- and undersides (natural size)

Parnassius Latreille

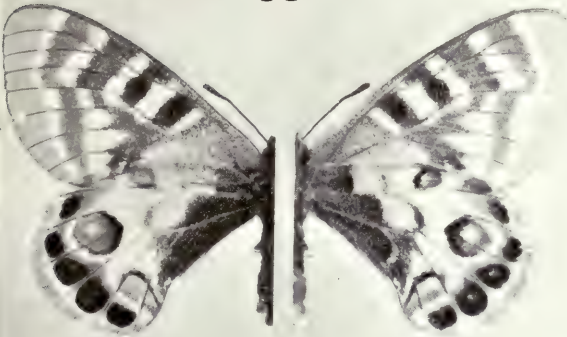
- FIG. 65. *charltonius serenissimus* (Bryk) ♂ (Kashmir: Kutie Pass)
FIG. 66. *charltonius serenissimus* (Bryk) ♀ (Kashmir; Dugi Pass & Reyling)
FIG. 67. *inopinatus inopinatus* Kotzsch ♂ (Afghanistan: Marak)
FIG. 68. *inopinatus inopinatus* Kotzsch ♀ (Afghanistan: Marak)
FIG. 69. *loxias loxias* Püngeler ♂ (China: Sinkiang, Aksu)
FIG. 70. *loxias loxias* Püngeler ♀ (China: Sinkiang, Tien Shan)
FIG. 71. *autocrator autocrator* Avinoff ♂ (Afghanistan: Hindu Kush)
FIG. 72. *autocrator autocrator* Avinoff ♀ (Afghanistan: Hindu Kush)



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PLATE 10

Upper- and undersides (natural size)

Parnassius Latreille

- FIG. 73. *simo simonius* Staudinger ♂ (U.S.S.R.: Turkestan)
FIG. 74. *simo simonius* Staudinger ♀ (U.S.S.R.: Kirghizia, Transalai)
FIG. 75. *tenedius tenedius* Eversmann ♂ (U.S.S.R.: Sajan Mts, Arasagun-gol)
FIG. 76. *tenedius tenedius* Eversmann ♀ (U.S.S.R.: Sajan Mts, Arasagun-gol)

Sericinus Westwood

- FIG. 77. *montela shantungensis* Hering ♂ (China: Shantung)
FIG. 78. *montela montela* Gray ♀ (China: Hopei, Peking)

Parnalius Rafinesque

- FIG. 79. *cerisy speciosa* (Stichel) ♂ (Lebanon: Beirut)
FIG. 80. *cerisy speciosa* (Stichel) ♀ (Lebanon: Beirut)



PLATE II

Upper- and undersides (natural size)

Parnalius Rafinesque

- FIG. 81. *polyxena polyxena* (Denis & Schiffermüller) ♂ (Yugoslavia: Kragouyevatz)
FIG. 82. *polyxena polyxena* (Denis & Schiffermüller) ♀ (Hungary)
FIG. 83. *rumina rumina* (Linnaeus) ♂ (Spain)
FIG. 84. *rumina rumina* (Linnaeus) ♀ (Spain)

Luehdorfia Crüger

- FIG. 85. *puziloi puziloi* (Erschoff) ♂ (U.S.S.R.-China: Amur)
FIG. 86. *puziloi puziloi* (Erschoff) ♀ (U.S.S.R.-China: Amur)
FIG. 87. *japonica japonica* Leech ♂ (Japan: Honshu, Oyama)
FIG. 88. *japonica japonica* Leech ♀ (Japan: Honshu, Oyama)
FIG. 89. *japonica chinensis* Leech ♂ (China: Kiangsu, Nanking)
FIG. 90. *japonica chinensis* Leech ♀ (China: Hupeh, Chang-Yang)



PLATE 12

Upper- and undersides (natural size)

Bhutanitis Atkinson

- FIG. 91. *mansfieldi* (Riley) ♀ holotype (China: Yunnan)
FIG. 92. *thaidina thaidina* (Blanchard) ♂ (China: Yunnan, Tsekou)
FIG. 93. *thaidina thaidina* (Blanchard) ♀ (China: Szechwan, Ta-tsien-lou)



PLATE 13

Upper- and undersides (natural size)

Bhutanitis Atkinson

FIG. 94. *lidderdalii lidderdalii* Atkinson ♂ (India: Naga Hills, Kohima)

FIG. 95. *lidderdalii lidderdalii* Atkinson ♀ (Bhutan)

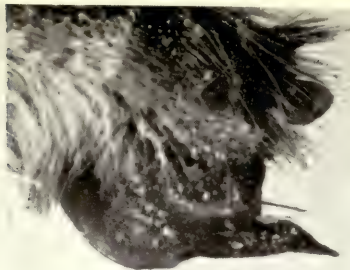


PLATE 15

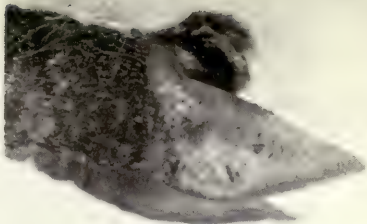
Lateral view of sphragis

Parnassius Latreille

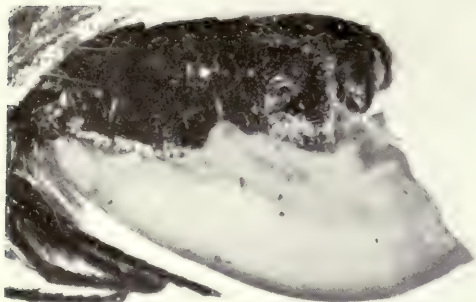
- FIG. 98. *apollo* (Linnaeus)
- FIG. 99. *mnemosyne* (Linnaeus)
- FIG. 100. *szechenyii* Frivaldsky
- FIG. 101. *acdestis* Grum-Grshimailo
- FIG. 102. *delphius* (Eversmann)
- FIG. 103. *imperator* Oberthür
- FIG. 104. *charltonius* Gray
- FIG. 105. *inopinatus* Kotzsch



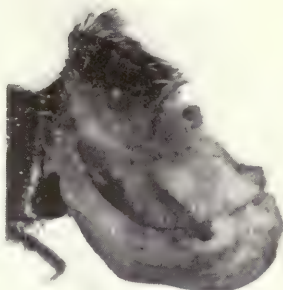
98



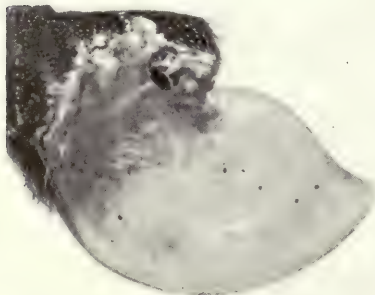
102



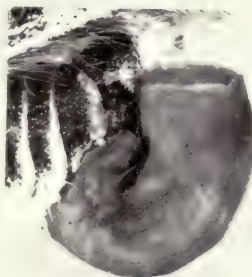
99



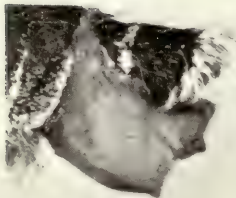
103



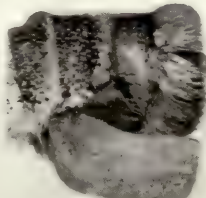
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THE *NESOTHRIPS* COMPLEX
OF SPORE-FEEDING THYSANOPTERA
(PHLAEOTHIRIPIDAE: IDOLOTHRIPINAE)



L. A. MOUND

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 31 No. 5
LONDON : 1974

THE *NESOTHRIPS* COMPLEX
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(PHLAEOTHIRIPIDAE : IDOLOTHRIPINAE)

BY
LAURENCE ALFRED MOUND

Pp 107-188; 74 Text-figures

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THE BULLETIN OF THE BRITISH MUSEUM (NATURAL HISTORY), *instituted in 1949, is issued in five series corresponding to the Departments of the Museum, and an Historical series.*

Parts will appear at irregular intervals as they become ready. Volumes will contain about three or four hundred pages, and will not necessarily be completed within one calendar year.

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This paper is Vol. 31 No. 5 of the Entomological series. The abbreviated titles of periodicals cited follow those of the World List of Scientific Periodicals.

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THE *NESOTHRIPS* COMPLEX OF SPORE-FEEDING THYSANOPTERA (PHLAEOTHRIPIDAE : IDOLOTHRIPINAE)

By L. A. MOUND

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SYNOPSIS

Difficulties in the definition of genera among the Cryptothripini are correlated with the biology of these spore-feeding thrips which live in leaf litter and on freshly dead wood. *Nesothrips* is divided into five genera, each with a restricted geographical distribution, but the structural characteristics on which these genera are based are weak and overlapping. Keys are provided to twelve genera and one hundred and one species, and three species are transferred to the subfamily Phlaeothripinae. Two new genera and seven new species are described and sixteen new synonymies are established. These synonymies suggest that some species have been transported between various tropical countries by human commerce.

INTRODUCTION

THE GENUS *Nesothrips* has been interpreted by recent authors in different ways. Stannard (1957) used the name for a large group of species with a wide range of morphological characteristics and placed eight generic names in synonymy. Priesner (1961), however, retained a large element of the traditional classification and recognised five genera in the group when proposing a classification of the suborder Tubulifera. Unfortunately neither of these authors was able to examine the full range of forms in the *Nesothrips*-complex because the collections of J. D. Hood and R. S.

Bagnall were not readily available at the time. In the present study one hundred species are recognized in the complex and through the courtesy of many colleagues the author has been able to study type-material or authentic specimens in all except two instances. As a result a more traditional view has been adopted using relatively small genera. The generic classification of the whole tribe Cryptothripini is in need of revision, but the present study is concerned solely with those species which have been associated with *Nesothrips* or the closely related genus *Rhaebothrips*.

RECOGNITION OF GENERA

In the Cryptothripini the individual genera intergrade in a confusing pattern and it was for this reason that Stannard (1957) used *Nesothrips* in a broad sense. However, this has several disadvantages; it obscures the fact that certain species of *Nesothrips* are morphologically more similar to species in other genera than they are to other species of *Nesothrips*; it conceals the fact that closely related groups of species tend to occur nearer to each other geographically than do less related species; it conceals the structural diversity of the *Nesothrips* group. If the genus is used in Stannard's sense then *Rhaebothrips* and *Acallurothrips* must be included. Moreover some species of *Dichaetothrips* and *Scotothrips* then become difficult to distinguish from the enlarged genus. In this way the concept of a genus approaches Priesner's (1961) concept of a tribe or subtribe, and the name *Nesothrips* no longer calls to mind any concise set of structural, biological or geographical attributes. In order that genera reflect evolutionary relationships between groups of species it is sometimes necessary to admit that there are intermediate species. The use of subgenera may be helpful at times in these circumstances, but this would not be practical in the Cryptothripini in view of the complexity of the relationships between the various forms. The origin of these complex relationships probably lies in the lack of host or habitat specificity in many of these fungal-spore-feeding thrips (Mound & O'Neill, 1974 and also below).

DISTRIBUTION OF GENERA

The generic analysis in this paper has been facilitated partly by establishing the synonymy of several tropical tramp species, and partly by transferring to *Neosmerinthothrips* several South American species described in *Gastrothrips*. The result is not completely satisfactory, but in that it establishes a correlation between structural similarity and geographical distribution this system probably reflects evolutionary relationships. The genus *Nesothrips* sensu stricto is based on a species from Hawaii and is used here for a group of species from the Pacific, Australia and New Zealand. This is itself a difficult group of species which are not all closely related, and some of which are very closely related to *Rhaebothrips* species from the Pacific and New Zealand. *Carientothrips* is another related genus but this has its centre of diversity in Australia rather than the Pacific Islands. In contrast *Bolothrips* is a holarctic genus usually associated with grass tussocks, but with several species in South Africa. *Gastrothrips* is a Neotropical genus with a few species entering North

America and one species-group widespread (?introduced) in the old world. The remaining large genus, *Neosmerinthothrips*, is more confusing with species apparently native to various parts of the tropics. The characters on which these genera are separated are summarised in the key below, although few of the genera can be distinguished on single characters.

SPECIATION IN LITTER THRIPS

The species of the subfamily Idolothripinae (= Megathripinae), to which the *Nesothrips* complex belongs, all feed on fungal spores, judging from the gut contents of the specimens which have been studied. They usually live in leaf litter or on freshly dead wood and they are found mainly in the tropics. This habitat is widespread and readily available across large parts of the earth's surface, and there is no evidence that the fungi on which the thrips feed are restricted in their distribution. This has important effects on the biology of the thrips, their dispersive activity and resultant speciation, as well as the ease with which they are transported by man. Although the habitat is widespread the nutritional status of the fungi at any one site varies with the state of decay of the substratum. This fluctuation in suitability of the habitat has probably stimulated the evolution of winged and wingless morphs in many species, as well as the production of major and minor (oedymorous and gynaeoid) individuals. It is assumed that this structural diversity within individual species is controlled largely by the environment and that the flexibility of the morphogenetic process is itself inherited. The evolution of such a group, within which each species is structurally diverse, can be expected to produce a complicated series of forms difficult to classify into genera. Moreover the lack of host specificity and the irregular production of winged individuals is likely to facilitate gene flow between populations of incipient species. This could have caused the complicated patterns of variation between populations that are found apparently irregularly in *Carientothrips mjobergi* (Mound, 1974) and *Biconothrips* species (Mound, 1972b) or in clines as in *Bolothrips* species (q.v.) and *Allothrips megacephalus* (Mound, 1972a).

THRIPS DISPERSION BY MAN

Several species of fungus-feeding thrips from leaf litter and dead wood appear to have been distributed around the world by human commerce. Some of these have been referred to elsewhere (Mound, 1970 : 87, *Nesothrips propinquus* and *Hoplandrothrips flavipes*), and the establishment of new synonymy in the present study has revealed further examples e.g. *Scotothrips claripennis*, *Neosmerinthothrips collaris* and *Rhaebothrips lativentris*. Such species have probably been transported in sailing ships: in dry grasses used as fodder and bedding; in seed pods and coconut husks; in baskets or tubs of plants; on dead wood, or in ballast. Different species seem to be associated with different shipping routes. Thus *N. propinquus* is found along the route from Europe to New Zealand via South Africa. *N. collaris* is found in West Africa and the West Indies, the two ends of one of the major slave

trading routes, and this lends support to the suggestion made in this paper that *Neosmerinthothrips hiliaris* from West Africa and *N. diversicolor* from Brazil may be variants of one species. A similar situation is found in the Phlaeothripine genus *Rhinoceps*. The first species in this genus, *R. jansei* Faure, 1949, was described from south-east Africa, the second species, *R. cornutus* zur Strassen, 1972, from Colombia, and there is a third (?) species in the BMNH collection from Ghana. However, in view of the very small differences between these 'species' it seems more likely that they are merely local variants which have been distributed by man. A distribution involving south-east Africa and the West Indies is also found in *Scotothrips claripennis* and *Neosmerinthothrips collaris*, and again this relationship calls to mind the slave trading pattern of the seventeenth and eighteenth centuries. It would not have been possible to transport more than a million men and women in conditions of appalling squalor without transporting fungus-feeding and detritus-living insects. The fact that *S. claripennis* is also found in India may reflect even earlier patterns of human trading. Ships have crossed the Indian ocean for several thousand years between such distant points as China and East Africa, and this could well explain much of the present-day distribution of such species as *Nesothrips brevicollis*.

ACKNOWLEDGEMENTS

This study would not have been possible without the active support of many colleagues. Dr Jacot-Guillarmod of Grahamstown, South Africa and the late Professor Priesner of Linz, Austria not only loaned many valuable specimens from their collections, but also gave the author the benefit of their experience with the Cryptothripini in the initial stages of the project. Kellie O'Neill of Washington, Professor Ananthakrishnan of Madras and Dr zur Strassen of Frankfurt also loaned numerous specimens. To all of these the author is deeply grateful. Figures 1-58 in this paper were all drawn to the same magnification by my colleague Mrs Jenny Palmer, and figures 59-74 were all drawn by the author to a different magnification.

ABBREVIATIONS

The following abbreviations are used for depositories.

AMG	Albany Museum, Grahamstown, South Africa
ANIC	Australian National Insect Collection, C.S.I.R.O., Canberra
BMNH	British Museum (Natural History)
BPBM	Bernice P. Bishop Museum, Hawaii
CAS	California Academy of Sciences, San Francisco
DSIR	Department of Scientific & Industrial Research, Auckland, New Zealand
FDA	Florida Department of Agriculture, Gainesville, U.S.A.
HP	Dr H. Priesner collection, Linz, Austria
INHS	Illinois Natural History Survey, Urbana, U.S.A.
NR	Naturhistoriska Riksmuseum, Stockholm
Pretoria	Plant Protection Research Institute, Pretoria, South Africa

NZFI	New Zealand Forest Research Institute, Rotorua
QM	Queensland Museum, Brisbane, Australia
SMF	Senckenberg Museum, Frankfurt
TM	Természettudományi Múzeum, Budapest
TNA	Professor Ananthakrishnan collection, Loyola College, Madras, India
USNM	United States National Museum (National Museum of Natural History), Washington D.C.

The following abbreviations are used in the descriptions of species for the major setae of the pronotum.

am	anteromarginal setae	epim	epimeral setae
aa	anteroangular setae	pa	posteroangular setae
ml	midlateral setae		

CHECK-LIST OF THE SPECIES DISCUSSED IN THIS PAPER

Family **PHLAEOTHRIPIDAE** Uzel

Phloeothripidae Uzel, 1895

Subfamily **IDOLOTHRIPINAE** Bagnall

Idolothripidae Bagnall, 1908

Megathripidae Bagnall, 1914

Megathripinae Bagnall; Karny, 1919

BOLOTHRIPS Priesner, 1926 **gen. rev.**

Bolothrips (*Botanothrips*) Hood, 1939

bicolor (Heeger, 1852)

bicolor brevicornis Priesner, 1928

andrei Watson, 1933

cinctus Faure, 1943

cingulatus (Karny, 1916)

dentipes (Reuter, 1880)

bagnalli (Karny, 1916)

dentis Faure, 1954

embotyi Faure, 1943

gilvipes Hood, 1914

litoreus Hood, 1939 **syn. n.**

icarus (Uzel, 1895)

icarus pallipes (Uzel, 1895)

insularis (Bagnall, 1914)

icarus tuberculatus (Priesner, 1922)

brachyurus (Bagnall, 1927)

arenarius Priesner, 1950 **syn. n.**

italicus sp. n.

pratensis Hood, 1939

rachiphilus Cott, 1956

schafferi (Thomasson & Post, 1966)

comb. n.

varius Hartwig, 1948

CARIENTOTHRIPS Moulton, 1944 **stat. n.**

acti Mound, 1974

badius (Hood, 1918) **comb. n.**

apterus (Girault, 1928)

biformis (Moulton, 1939) **comb. n.**

capricornis (Mound, 1974) **comb. n.**

casuarinae Mound, 1974

denticulatus (De Santis, 1963) **comb. n.**

fijiensis Moulton, 1944

grayi sp. n.

japonicus (Bagnall, 1921) **comb. n.**

loisthus Mound, 1974

magnetis Mound, 1974

miskoi Mound, 1974

mjobergi (Karny, 1920)

australicus (Priesner, 1928)

incisus (Girault, 1927)

flavitibia (Moulton, 1968)

pedicillus Mound, 1974

pictilis Mound, 1974

reedi Mound, 1974

semirufus (Girault, 1928)

vesper Mound, 1974

DICERATOTHRIPS Bagnall, 1908

validipennis (Hood, 1938) **comb. n.**

DICHAETOTHRIPS Hood, 1914

gloveri (Ramakrishna Ayyar & Marga-bandhu, 1939) **comb. rev.**

GASTROTHRIPS Hood, 1912 **gen. rev.**

Probolothrips Moulton, 1941

abditus Hood, 1935

brasilensis (Moulton, 1938)

hambletoni (Moulton, 1941)

acuticornis (Hood, 1925)

cybele (Girault, 1927)

noumeae Bianchi, 1945

alticola Hood, 1942

anolis Morgan, 1925

proteus Hood, 1933

callipus Hood, 1935

corvus Priesner, 1933

capitalis Hood, 1935 **syn. n.**

falcatus Ananthakrishnan, 1968 **comb. n.**

fulvicauda Hood, 1937

fulviceps Hood, 1937

fumipennis Hood, 1952

intonsus Hood, 1941

mandioca (Moulton, 1941)

oeceticola De Santis, 1943

mongolicus Pelikan, 1965 **comb. n.**

monticola Hood, 1942

procerus Hood, 1956

ruficauda Hood, 1912

stygius Hood, 1935

subulatus (Hartwig, 1948) **comb. n.**

texanus Hood, 1912

NEOSMERINTHOTHRIPS Schmutz,

1913 **gen. rev.**

Coenurothrips Bagnall, 1921

Galactothrips Moulton, 1933 **syn. n.**

affinis (Bagnall, 1921) **comb. n.**

annulipes (Hood, 1950) **comb. n.**

milleforme (De Santis, 1963) **syn. n.**

brevicollis (Bagnall, 1921) **comb. n.,**

stat. rev.

collaris (Bagnall, 1917) **comb. n.**

fuscicauda (Morgan, 1925) **syn. n.**

marshalli (Priesner, 1934) **syn. n.**

dominicanus (Hood, 1925) **syn. n.**

diversicolor (Moulton, 1933) **comb. n.**

fijiensis (Moulton, 1944) **comb. n.**

fructuum Schmutz, 1913

ceylonicus (Karny, 1925) **syn. n.**

hilaris (Priesner, 1937) **comb. n.**

hoodi (Faure, 1954) **comb. n.**

inquilinus Ananthakrishnan, 1960

nigrisetis (Hood, 1935) **comb. n.**

parvidens (Hood, 1935) **comb. n.**

paulistarum (Hood, 1950) **comb. n.**

picticornis (Hood, 1936) **comb. n.**

plaumanni (Hood, 1950) **comb. n.**

robustus (Ananthakrishnan, 1964)

comb. n.

variipes (Hood, 1950) **comb. n.**

xylebori Priesner, 1935

NESIDIOTHRIPS **gen. n.**

alius (Ananthakrishnan, 1970) **comb. n.**

validus (Bagnall, 1921) **comb. n.**

NESOTHRIPS Kirkaldy, 1907

Oedemothrips Bagnall, 1910

aoristus Mound, 1974

artocarpi (Moulton, 1942)

brevicollis (Bagnall, 1914)

minor (Bagnall, 1921) **syn. n.**

formosensis (Priesner, 1935) **syn. n.**

formosensis karnyi (Priesner, 1935)

syn. n.

carverae Mound, 1974

fodinae **sp. n.**

hemidiscus Mound, 1974

malaccae **sp. n.**

melinus Mound, 1974

niger (Moulton & Steinweden, 1932)

oahuensis Kirkaldy, 1907

laticeps (Bagnall, 1910)

propinquus (Bagnall, 1916)

dimidiatus (Hood, 1918)

propinquus breviceps (Bagnall, 1924)

propinquus obscuricornis (Bagnall, 1924)

cestosa (Karny, 1920)

oleriae (Moulton, 1949)

similis (Hartwig, 1948) **syn. n.**

rhizophorae (Girault, 1927)

semiflavus (Moulton, 1939)

yanchepti Mound, 1974

PHACOTHRIPS **gen. n.**

ocelloides (Hood, 1950) **comb. n.**

RHAEBOTHRIPS Karny, 1913

doulli **sp. n.**

eastopi **sp. n.**

lativentris Karny, 1913

claripennis (Hood, 1919)

seychellensis (Bagnall, 1921) **syn. n.**

difficilis (Bagnall, 1921) **syn. n.**

ipomoeae (Ishida, 1932)

magnus (Moulton, 1928)

yuasai (Moulton, 1928)

fuscus Moulton, 1942

australiensis (Moulton, 1968)

leverii **sp. n.**

major Bagnall, 1928

nigrisetis Sakimura, 1972

zondagi **sp. n.**

SCOTOTHRIPS Priesner, 1939*claripennis* (Moulton, 1934) **comb. n.***trinidadensis* (Hood, 1935) **syn. n.***indicus* (Ananthakrishnan, 1968)**syn. n.***diversus* (Ananthakrishnan, 1972)**syn. n.***firmus* (Hood, 1952) **comb. n.****SYNCEROTHRIPS** Hood, 1935 **gen. rev.***harti* Hood, 1935Species removed from *Nesothrips* complexSubfamily **PHLAEOTHRIPINAE** Uzel, 1895*Adelothrips lativerticis* (Post, 1961)
comb. n.*Adelothrips speciosissimus* (Karny, 1920)
Liothrips debilis (Hood, 1936) **comb. n.**KEY TO THE GENERA OF THE *NESOTHRIPS* COMPLEX

- 1 Antennal segment IV with two sense cones (Text-fig. 59) 2
- Antennal segment IV with three or more sense cones (Text-figs 61–74) 4
- 2 Antennal segment VIII less than twice as long as wide, broadly joined to VII; head not projecting in front of eyes; interocellar setae twice as long as distance between two ocelli; female with a fore tarsal tooth [South Africa] ***Bolothrips dentis*** (p. 120)
- Antennal segment VIII slender, twice as long as wide; head strongly projecting in front of eyes; no elongate setae near the ocelli (Text-fig. 1); female without a fore tarsal tooth 3
- 3 Antennal segment III with two sense cones; prothorax and all legs yellow in both sexes, rest of body brown [Europe and eastern North America]
Bolothrips bicolor (p. 118)
- Antennal segment III with one sense cone; prothorax brown in ♀, legs brown with yellow markings on the femora, ♂ with pronotum and pterothorax yellow with brown shadings laterally [Italy] ***Bolothrips italicus*** (p. 122)
- 4 Antennal segment IV with three sense cones (Text-figs 64, 65) 5
- Antennal segment IV with four or rarely five sense cones (Text-figs 66–74) 7
- 5 Eyes usually longer ventrally than dorsally, if eyes not prolonged ventrally then metanotal setae weak and pelta broadly rounded; tube always black with straight sides (Text-fig. 13); ♂ and ♀ usually apterous, ♀ rarely macropterous [mainly Holarctic] ***BOLOTHRIPS*** (p. 117)
- Eyes rarely prolonged on ventral surface of head; one pair of metanotal setae frequently stout; pelta usually triangular and never broadly rounded; tube variable, frequently yellow, or with apex sharply constricted (Text-figs 14–19); ♀ usually macropterous, rarely micropterous or apterous; ♂ macropterous or apterous [mainly Neotropical] 6
- 6 Antennal segment VIII distinct from VII, usually long and slender, rarely less than 0.75 times as long as VII ***GASTROTHRIPS*** (p. 134)
- Antennal segment VIII broadly fused to VII, the suture incomplete dorsally
SYNCEROTHRIPS (p. 181)
- 7 Head with an ommatidia-like papilla on cheek, situated midway between posterior margin of eye and posterior margin of head (Text-fig. 47); tube margins strongly convex, maximum diameter about five times apical diameter (Text-fig. 51); fore wing without duplicated cilia [Brazil] ***PHACOTHRIPS*** (p. 170)
- Head with normal cheeks, rarely with one isolated ommatidium close behind compound eye; tube frequently with straight sides, if convex then maximum diameter

- less than three times apical diameter; fore wing when present rarely lacking duplicated cilia 8
- 8 Head with a pair of stout setae anterolateral to the fore ocellus but with no other long setae near the ocelli (rarely with these setae shorter than one side of ocellar triangle) (Text-fig. 9); antennal segment III more than 1.3 times as long as IV, segments VII and VIII with a complete suture but forming a single unit with an almost smooth outline (Text-fig. 66); pronotum broad and weakly reticulate, with anterior and median ridge scarcely thickened even in major males, and midlateral setae usually small; fore femora of males frequently with a series of stout spines on inner margin [Neotropics] **DICERATOTHRIPS** (p. 133)
- Head with a pair of stout setae between or behind the ocelli, or with no long setae near the ocelli; antennal segment III less than 1.2 times as long as IV, segment VIII usually smaller at base than VII at apex; pronotum frequently with a stout median thickening, anterior margin often thickened in males, and midlateral setae rarely small; fore femur of ♂ without spine-like setae 9
- 9 Head with a pair of long setae arising within the ocellar triangle, midway between anterior and posterior ocelli (Text-fig. 46); fore tarsus of ♀ with a stout tooth **NESIDIOTHRIPS** (p. 156)
- Head with a pair of long setae arising between or behind the posterior ocelli, or ocellar setae all short; fore tarsus of ♀ frequently without a tooth 10
- 10 Fore tarsal tooth well developed in ♀; head always longer than wide, eyes never prolonged on ventral surface of head; ocellar setae arising behind posterior ocelli; cheeks frequently with several stout setae; tube slender with straight sides, evenly narrowing from base to apex 11
- Fore tarsal tooth usually absent in ♀; if present then eyes prolonged on ventral surface of head, or ocellar setae arising between posterior ocelli, or head as wide as long and constricted to base without cheek setae, or tube heavy with stout setal tubercles or even with convex sides 12
- 11 Postocellar setae longer than one side of ocellar triangle; cheeks with fine setae (Text-fig. 8) **DICHAETOTHRIPS** (p. 134)
- Postocellar setae shorter than one side of ocellar triangle; cheeks frequently with stout setae **SCOTOTHRIPS** (p. 177)
- 12 Maxillary stylets retracted into head as far as postocular setae, parallel in middle of head and about one third of head width apart (Text-fig. 2); pelta of macropterae usually with very slender lateral wings [Pacific, Australia, Falkland Is] **CARIENTOTHRIPS** (p. 125)
- Maxillary stylets wide apart, arranged in a V-shape and usually low in head (Text-figs 40–42); pelta of macropterae without slender lateral wings 13
- 13 Tube heavy with sides convex (Text-figs 35–37) and head with no elongate ocellar setae; or fore tarsal tooth present in ♀, and tube heavy with one or more pairs of lateral setal bases, ocellar setae rarely elongate [Oriental, Ethiopian and Neotropical regions] **NEOSMERINTHOTHRIPS** (p. 148)
- Tube with straight sides, sometimes slightly constricted at apex (Text-figs 44, 56); fore tarsal tooth rarely present in ♀; postocellar setae usually longer than diameter of one ocellus, frequently arising between the posterior ocelli [Pacific and Australian regions, introduced elsewhere] 14
- 14 Postocellar setae close together arising between the posterior ocelli (Text-figs 52–54); tube rarely less than three times as long as maximum width; ♀ rarely with a fore tarsal tooth **RHAEBOTHRIPS** (p. 171)
- Postocellar setae frequently arising behind posterior ocelli, if arising between the ocelli than the tube is shorter, less than 2.5 times as long as maximum width; ♀ never with a fore tarsal tooth 15
- 15 Head more than 1.3 times as long as wide **CARIENTOTHRIPS** (part) (p. 125)
- Head less than 1.2 times as long as wide **NESOTHRIPS** (p. 158)

GENERA AND SPECIES DISCUSSED ALPHABETICALLY

BOLOTHRIPS Priesner **gen. rev.**

Bolothrips Priesner, 1926 : 90. Type-species: *Phloeothrips bicolor* Heeger, by original designation

Bolothrips (*Botanothrips*) Hood, 1939 : 605–606. Type-species: *Bolothrips pratensis* Hood, by original designation.

The genus *Bolothrips* is used here for a group of fourteen Holarctic and Ethiopian species which live at the base of grass tussocks and only rarely produce macropterae. The more common species appear to exist as irregular clines, for example the *gilvipes*, *litoreus*, *rhachiphilus* complex in North America, and the *insularis*, *icarus*, *varius* complex in Europe and Africa. The interpretation of these clines nomenclatorially must be rather arbitrary.

Most species of *Bolothrips* have three sense cones on the fourth antennal segment, although the ventral sense cone is missing in the type-species *bicolor* as well as in *dentis* Faure. *Gastrothrips* species also have three sense cones on the fourth antennal segment although these are usually rather stouter than in *Bolothrips* species. Moreover most species of *Gastrothrips* have a pair of stout metanotal setae, a triangular pelta, and well developed wings. *Botanothrips* has been used for a group of species in which the eyes are not prolonged ventrally, but this is not accepted here in view of the variation in *insularis* and *varius*. One species, *dentis* Faure, is retained in *Bolothrips* for the present although it combines the characters of several genera.

GENERIC DEFINITION. Medium sized, black or bicoloured, rarely pale species of Cryptothripini. Head usually longer than wide, projecting in front of eyes, with eyes prolonged or at least narrowed ventrally; maxillary stylets V-shaped and wide apart. Antennae eight segmented, VIII more than 0.5 times as long as VII; segment III with two (rarely one) sense cone, IV with three (rarely two) sense cones. Pronotum with epimeral sutures complete; ♂ with fore tarsal tooth and frequently with fore tibial apical tubercle; ♀ without tooth or tubercle. Usually apterous, fore wing with duplicated cilia in *bicolor* and *icarus*. Metanotal median setae small and slender. Pelta usually broadly rounded; tube with straight sides.

KEY TO THE SPECIES OF *BOLOTHRIPS*

- 1 Body colour light yellowish brown, abdominal segments VIII–X lightest [South Africa] **embyoti* (p. 120)
- Body colour dark brown, thorax sometimes yellow, abdominal segments VIII–IX darker than rest of body 2
- 2 Antennal segment IV with two sense cones, the ventral one missing 3
- Antennal segment IV with three sense cones 5
- 3 Fore tarsal tooth present in ♀; interocellar setae longer than distance between ocelli; tube paler than abdomen, constricted at apex [South Africa] *dentis* (p. 120)
- Fore tarsal tooth not present in ♀; interocellar setae not elongate; tube with sides straight 4
- 4 Prothorax and all legs yellow in both sexes, rest of body brown; antennal segment III with two sense cones [Europe, eastern North America] *bicolor* (p. 118)
- Prothorax brown in ♀, legs brown with yellow markings; ♂ with prothorax and pterothorax yellow but shaded brown laterally; antennal segment III with one sense cone; Italy *italicus* (p. 122)

ex Uzel Collection. FRANCE: Villefranche sur Saone, 3 ♂, 2 ♀, ix-x.1927 (*O. John*); Hyères Plage, 1 ♂, ix.1927 (*R. S. Bagnall*) (BMNH).

U.S.A.: Illinois, Grundy County, 1 ♂, x.1970 (*L. A. Mound*); Minnesota, MacGregor, 7 ♀, 3 ♂ apterae, 1 ♀ macroptera, iv.1936 (*F. Andre*); M., Hay Creek, 2 ♀, 1 ♂, xi.1936 (*G. Decker*); Iowa, Ottumwa, 27 ♂, 22 ♀, in Moss, i.1933; I., Boone, 7 ♀, 7 ♂, from *Poa*, vii-viii.1934 (*F. Andre*); North Dakota, Northwood, 1 ♀, iv.1961 (*R. I. Post*); Utah, Blacksmith Fork Canyon, 1 ♀, iv.1971 (*G. F. Knowlton*) (BMNH).

Bolothrips cinctus Faure

Bolothrips (Bolothrips) cinctus Faure, 1943 : 86-87. Syntypes 2 ♀, SOUTH AFRICA: Transvaal (Pretoria) [not examined].

This species has a shorter tube than any other species of *Bolothrips*, and it can be distinguished moreover by its colour pattern. The two syntype apterae were collected from *Themeda triandra* near Lydenburg, Transvaal.

SPECIMEN STUDIED.

SOUTH AFRICA: Transvaal, Ermelo, 1 ♀ aptera on *Hyparrhenia*, 21.v.1949 (*J. C. Faure*) (HP).

Bolothrips cingulatus (Karny)

Cryptothrips cingulatus Karny, 1916 : 92. Syntypes ? sex, AUSTRIA (HP) [not examined].

Bolothrips cingulatus (Karny) Priesner, 1926 : 90.

Priesner (1964 : 143) refers to this as a south-eastern European species and states that the macropterae have only the first and second abdominal segments light. The antennae of *cingulatus* are shorter than those of *bicolor* and *dentipes*.

SPECIMENS STUDIED.

HUNGARY: Simontornya, 1 ♂, 3 ♀ apterae, vi & ix. 1924 (*F. Pillich*). FRANCE: Rhône, Curis, 3 ♂, 1 ♀ apterae, viii. 1927 (*O. John*); Hyères Plage, 1 ♀ aptera, ix. 1927 (*R. S. Bagnall*) (BMNH).

Bolothrips dentipes (Reuter)

Phloeothrips dentipes Reuter, 1880 : 12-14. 2 Syntypes, ? sex, FINLAND (? lost).

Bolothrips dentipes (Reuter) Priesner, 1928a : 689-692.

Cryptothrips bagnalli Karny, 1916 : 94. Syntypes, ? sex, SARDINIA (? lost).

Cryptothrips dentipes var. *bagnalli* Karny; Priesner, 1925 : 154.

This species is widespread in Europe between Ireland, Poland and Hungary. There are numerous specimens in the BMNH collections from southern England, and also one female without data but bearing a determination label 'Reuter det. 3.84'. Stannard (1968) records the species from Illinois, and one specimen has been studied from Massachusetts.

***Bolothrips dentis* Faure**

Bolothrips dentis Faure, 1954b : 155-159. Holotype ♂, TRANSVAAL (Pretoria) [not examined].

This species was described from 14 males and 26 females, all apterae, collected at Mariepskop in Transvaal, mainly on dead branches covered in lichen. The combination of morphological characters is most unusual. The head is truncate at the anterior and bears a pair of stout interocellar setae, but the eyes are prolonged ventrally. The fore tarsus of the female bears a tooth but the fourth antennal segment has two sense cones. The tube is pale in colour and constricted at the apex. This one species thus shows characteristics from each of the genera of the *Nesothrips* complex. It is not a true *Bolothrips* species but is retained in this genus until the South African fauna is better known.

SPECIMENS STUDIED.

TRANSVAAL: Mariepskop, 2 ♀ paratypes on dead branches of *Syzygium cordatum*, iv. 1951 (J. C. Faure) (HP, AMG).

***Bolothrips embotyi* Faure**

Bolothrips (Bolothrips) embotyi Faure, 1943 : 87-89. Syntypes 5 ♀, 7 ♂, SOUTH AFRICA: Pondoland (Pretoria) [not examined].

No specimens of this species have been studied. Judging from the description it is a true *Bolothrips* with the eyes prolonged ventrally, the head projecting in front of the eyes, the fourth antennal segment with three sense cones, and the female without a fore tarsal tooth.

***Bolothrips gilvipes* (Hood)**

Cryptothrips gilvipes Hood, 1914 : 169-170. Holotype ♀, U.S.A.: Maryland (USNM) [not examined].

Bolothrips (Bolothrips) litoreus Hood, 1939 : 609-612. Holotype ♀, U.S.A.: Texas (USNM) [not examined]. **Syn. n.**

This species appears to show a gradient in size and colour with the darkest specimens in the southern and western part of its range. The specimens from Florida listed below have the thorax varying in colour from yellow to light brown even at one site. In view of this variation there seems to be little point in distinguishing the larger and darker specimens as *litoreus*. The Californian species *rhachiphilus* is possibly another element in this cline.

SPECIMENS STUDIED.

U.S.A.: Alabama, Mobile, 1 ♂ on dead grass (det. *gilvipes* by J. D. Hood), 17.xii.1938 (J. D. Hood); Florida: Cedar Keys, 17 ♀, 1 ♂, on salt marsh grass, 12.vii.1939 (P. Oman); F., Lake Wauberg, 1 ♀, iv. 1938; F., Hudson, 1 ♂ on grass, vii. 1939; F., Deland, 1 ♀, 1 ♂ on grass, vii. 1939 (BMNH, USNM).

***Bolothrips icarus* (Uzel)**

Cryptothrips Icarus Uzel, 1895 : 232-233. Syntypes ♂ ♀, CZECHOSLOVAKIA: Bohemia (? lost).

Cryptothrips icarus var. *pallipes* Uzel, 1895 : 233.

Bolothrips icarus (Uzel) Priesner, 1928a : 692-695.

All of the specimens listed below have the legs more or less yellow with a variable amount of brown shading. The species is widespread from southern Europe to Latvia and is very closely related to the Mediterranean *insularis* and the African *varius*, but has paler legs and the eyes usually less prolonged ventrally. Three macropterous females have been studied from France.

SPECIMENS STUDIED.

FRANCE: Villefranche sur Saone, 3 ♂, 1 ♀, 1 ♀ macroptera, vii. 1927; Rhône, Curis, 1 ♂, 2 ♀ macropterae, viii. 1927 (*O. John*); La Trinite sur Mer, 1 ♂, viii. 1968 (*V. F. Eastop*). AUSTRIA: Innsbruck, 1 ♂, ix. 1929 (*R. S. Bagnall*). YUGOSLAVIA: Subotica, 1 ♂, vi. 1963. CZECHOSLOVAKIA: Ceje, 1 ♀, vi. 1950 (*J. Pelikan*); Bzendei, 3 ♂, v. 1964 (*V. F. Eastop*). HUNGARY: Simontornia, 3 ♀, 1 ♂, vi. 1924 (*Pillich*). U.S.S.R.: Latvia, 4 ♂, 1 ♀, vi. 1928; 2 ♂, 3 ♀, viii. 1929 (*O. John*) (BMNH).

***Bolothrips insularis* (Bagnall)**

Cryptothrips insularis Bagnall, 1914 : 295. Holotype ♀, CANARY ISLANDS (BMNH) [examined].

Cryptothrips icarus var. *tuberculatus* Priesner, 1922 : 105. Holotype ♀, YUGOSLAVIA (HP) [examined]. [Synonymized by Mound, 1968 : 141.]

Cryptothrips brachyurus Bagnall, 1927 : 573-574. Lectotype ♂, FRANCE (BMNH) [examined]. [Synonymized by Mound, 1968 : 141.]

Bolothrips arenarius Priesner, 1950 : 36-37. Syntypes ♂ ♀, EGYPT & SYRIA (HP) [examined].

Syn. n.

Priesner (1928 : 693) suggested that this species (under the name *tuberculatus*) might be a geographical race of *icarus*. Whereas *icarus* is found in continental Europe, *insularis* appears to be restricted to the Mediterranean area between the Canary Islands and Syria. Both species are variable, but they can apparently be distinguished by the characters given in the key above. Specimens from the eastern part of the range of *insularis*, Cyprus and Egypt, generally have the tube shorter and stouter than specimens from the western part of the range, Spain and the Canary Islands. The specimens from Cyprus appear to be intermediate between *insularis* and typical *arenarius* from Egypt.

SPECIMENS STUDIED.

Holotype ♀ of *insularis*, CANARY ISLANDS (*T. V. Wollaston*) (BMNH). Lectotype ♂ with 1 ♂, 1 ♀ paralectotypes of *brachyurus*, FRANCE: Tamaris, iii. 1927 (*R. S. Bagnall*) (BMNH). Holotype ♀, allotype ♂ [sic] of *tuberculatus*, YUGOSLAVIA: Dalmatia, Ragusa, from grass, 31.x.1918 (HP).

EGYPT: 40 km east of Meadi, 1 ♂, 1 ♀ paratypes of *arenarius*, on *Retama*, 9.iv.1934; Ismailia, 1 ♀, 23.iv.1935; Bingash, ♂ allotype, 17.i.1935 (HP). CANARY ISLANDS: Lancerota, 1 ♀ on grass, iii. 1963, 1 ♂, ii. 1968 (*zur Strassen*). SPAIN: Chiclana,

2 ♀. FRANCE: St Cyr sur Mer, 1 ♀, 2 ♂, ix. 1927 (*R. S. Bagnall*). CYPRUS: Akrotiri Bay, 8 ♂, 4 ♀ on *Juncus*, vii. 1945 (*Mavroumoustakis*) (BMNH).

Bolothrips italicus sp. n.

♀ aptera. Colour brown, head and posterior abdominal segments darker than pterothorax; femora variable in colour, mid and hind tibiae and tarsi dark brown, fore tarsi and inner surface of fore tibiae lighter; antennal segment III yellow, IV light brown, V slightly paler at extreme base; terminal setae of abdomen light brown.

Structure of body and antennae very similar to *dentipes* and *bicolor*, but head more slender, pterothorax distinctly alatiform, metanotum not sculptured; antennal segment III with one sense cone, IV with two sense cones.

MEASUREMENTS (holotype ♀ in μm). Body length 2900. Head, length 330; median width 230; postocular setae 100. Pronotum, length 175; width across fore coxae 320. Metathorax total width 315. Tergite IX setae B_1 170. Tube, length 210; basal width 100. Antennal segments length III–VIII length, 97; 97; 97; 80; 65; 45.

♂ aptera. Thorax paler than ♀, pronotum yellow but shaded brown laterally, pterothorax and abdominal segment I almost clear yellow; head and posterior abdominal segments dark brown; all femora extensively yellow on inner surface, mid and hind tibiae and tarsi brown; antennal segments IV and V paler than in ♀. Similar in structure to ♀ but fore tarsus with a slender tooth and fore tibia with an apical tubercle.

MEASUREMENTS (paratype ♂ in μm). Body length 1900 (body contracted). Head length 290. Tube, length 160; basal width 90.

SPECIMENS STUDIED.

Holotype ♀, ITALY (taken in quarantine at Detroit, U.S.A.): *Stipa tenacissima*, 27.xi.1961 (*J. Fergusson* 4087) (USNM).

Paratypes. 5 ♀, 6 ♂ collected with the holotype (USNM, BMNH).

COMMENTS. Unfortunately this species is known only from rather poorly preserved specimens taken in quarantine. It is described here because of its interesting relationship to *bicolor* and *dentipes*, and because it is the only member of the genus with one sense cone on the third antennal segment. The females are very similar to *dentipes* but have a shorter tube, and some of the specimens have the pterothorax and femora pale in colour.

Bolothrips pratensis Hood

Bolothrips (*Botanothrips*) *pratensis* Hood, 1939 : 606–609. Holotype ♀, U.S.A.: Texas (USNM) [not examined].

Despite the fact that the eyes are not prolonged on the ventral surface of the head, the present author does not agree with Hood that *pratensis* is closely related to the European and African *icarus*-group of species. The tube is particularly stout and the mesothoracic spiracles project as in *gilvipes*, and it is possible that *pratensis* is derived from forms with ventrally prolonged eyes. Most of the specimens listed below were collected on dead wood, in contrast to the type-series which came from grasses as is usual in *Bolothrips*.

SPECIMENS STUDIED.

U.S.A.; Texas, Palacios (type-locality), 1 ♀, 1 ♂ paratypes, 28.iii. & 23.iv.1939 (*J. D. Hood*); Florida, Upper Matecumbe Key, 5 ♂, 10 ♀ from dead branches, xii. 1958 (*Andre*); F., Grassy Key, 1 ♂, 1 ♀ on dead branches, xii. 1958 (*Andre*); F., Cedar Keys, 1 ♂, 1 ♀, vii. 1939 (*P. Oman*) (BMNH).

***Bolothrips rhachiphilus* Cott**

Bolothrips (*Bolothrips*) *rhachiphilus* Cott, 1956 : 181-182. Holotype ♀, U.S.A.: California (not known).

Type-material of this species has not been deposited in the California Academy of Sciences (Arnaud & Lee, 1973) as was stated in the original description. The species appears to be related to the dark forms of *gilvipes*.

***Bolothrips schafferi* (Thomasson & Post) comb. n.**

Nesothrips schafferi Thomasson & Post, 1966 : 31-32. Holotype ♀, U.S.A.: North Dakota (INHS) [not examined].

This species is closely related to *dentipes* in the form of the antennae, head and tube, but differs in the colour of the legs and antennae. It is known only from western North America.

SPECIMENS STUDIED.

U.S.A.: North Dakota, Benson County, Wood Lake, 3 ♀ paratypes on *Spartina pectinata*, 27.viii.1964 (*Thomasson & McBride*) (BMNH & USNM); Oregon, 2 ♀, 1 ♂, 15.iv.1937 (? *F. Andre*) (BMNH).

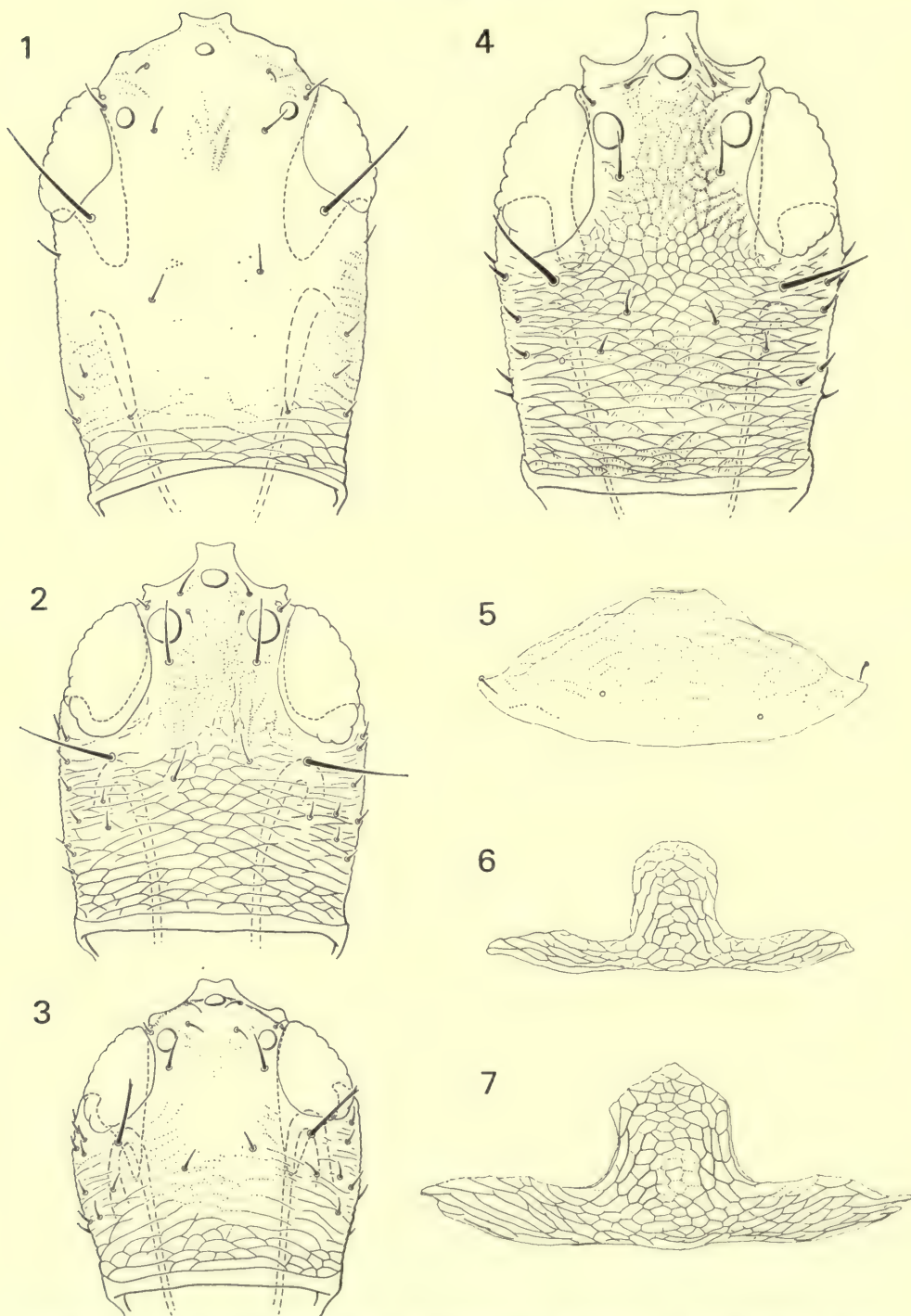
***Bolothrips varius* Hartwig**

Bolothrips varius Hartwig, 1948 : 110-112. Holotype ♀, SOUTH AFRICA: Transvaal (Pretoria) [not examined].

The original description of this species noted that the ventral length of the eyes varied from 'about equal to the dorsal length to about 1.4 times the dorsal length'. The eyes of *insularis* from the Mediterranean region also vary considerably, and these two species are closely related. Hartwig lists material of *varius* from Cape Province, Basutoland, Natal and Transvaal. The specimen listed below from Kenya has a slender head as in *varius* and *insularis*, but the legs and antennal segments are pale as in *icarus*. It is possible that further collecting will produce intermediates between these named forms.

SPECIMENS STUDIED.

SOUTH AFRICA: Transvaal, Pretoria, 1 ♂ paratype on *Panicum maximum*, 13.ii.1946 (*E. K. Hartwig* [data as for holotype]; 3 ♀, 1 ♂ on *P. maximum*, 8.v.1948 (*E. K. Hartwig*) (BMNH). KENYA: 1 ♀ on *Pinus*, vii.1963 (BMNH).



FIGS 1-7. 1, *Bolothrips italicus*. 2, *Carientothrips fijiensis*. 3, *C. mjobergi*. 4, *C. grayi*. 5-7. Pelta (first abdominal tergite): 5, *B. italicus*. 6, *C. fijiensis*. 7, *C. grayi*.

CARIENTOTHRIPS Moulton **stat. n.**

Bolothrips (*Carientothrips*) Moulton, 1944 : 306. Type-species: *Bolothrips* (*Carientothrips*) *fijiensis* Moulton, by monotypy.

This genus was placed as a synonym of *Nesothrips* by Stannard (1957) but is used here for a group of seventeen species from Australia and the Pacific, with one possibly unrelated form from South America. The macropterae of the type-species *fijiensis* are similar to a new species *grayi* described below from New Guinea, and also to the macropterae of the *mjobergi* complex from Australia. The micropterae of *fijiensis* are very similar to the more slender forms *loisthus* and *magnetis* from Australia and New Zealand, but the micropterae of *mjobergi* are much shorter and broader and at first sight look very different. These are related to other species in Australia with short broad heads, *miskoi* and *pedicillus*. Within *mjobergi* there are forms with the eyes prolonged ventrally or with the eyes equal in size on the dorsal and ventral surfaces, moreover the legs also vary from yellow to brown, and there is no clear evidence that these different forms represent distinct species. The pelta of the macropterae is frequently characteristic with very slender lateral wings, but the pelta of micropterae and apterae is reduced and such specimens are very similar to *Nesothrips* species. These two genera intergrade in Australia, but *Carientothrips* is used for a group of species with the stylets relatively close together in the head. Two species with the stylets wide apart are also included from Australia, *capricornis* which seems to be related to *semirufus*, and *badius* which is not closely related to any other species.

GENERIC DEFINITION. Medium sized, dark or pale species of Cryptothripini. Head longer than wide, or wider than long; eyes normal or reduced, sometimes longer on ventral than on dorsal surface; maxillary stylets usually parallel in middle of head and about one third of head width apart; ocellar setae usually well developed. Antennae eight-segmented, two sense cones on segment III, four sense cones on IV; segment VIII usually elongate. Fore tarsal tooth absent in ♀ (except *denticulatus*), present in ♂. Pronotum transverse, oedymorous individuals rare; epimeral sutures usually complete. Wings frequently absent. Pelta frequently with slender lateral wings; tube with straight sides.

KEY TO THE SPECIES OF CARIENTOTHRIPS

- | | | | |
|---|--|-----------|---------------------------|
| 1 | Antennal segment III with a shelf-like ring near the base (Text-fig. 60) | | 2 |
| — | Pedicle of antennal segment III simple | | 3 |
| 2 | Thorax and legs yellow, rest of body and head brown; antennal segments II–IV largely yellow [Australia] | | <i>pictilis</i> (p. 132) |
| — | Head light brown, thorax medium brown, abdomen dark, legs yellowish brown; antennal segments II–IV largely brown [Australia] | | <i>acti</i> (p. 126) |
| 3 | Metanotum with four to six pairs of setae medially in apterae, two pairs in macropterae; epimeral sutures incomplete | | 4 |
| — | Metanotum with one pair of median setae; epimeral sutures complete | | 6 |
| 4 | Antennal segment III 2.5 times as long as wide, pedicel stout bearing several transverse ridges (Text-fig 62) [Japan] | | <i>japonicus</i> (p. 130) |
| — | Antennal segment III either longer or shorter, pedicel slender | | 5 |
| 5 | Antennal segment III 2.1 times as long as wide [Australia] | | <i>reedi</i> (p. 132) |
| — | Antennal segment III 2.8 times as long as wide [Australia] | | <i>vesper</i> (p. 133) |
| 6 | Head broad, less than 1.2 times as long as wide | | 7 |
| — | Head slender, more than 1.3 times as long as wide | | 12 |

- 7 Body, legs and antennae dark brown except pedicel of III which is paler; pelta of macropterae and apterae rounded; eyes not extended on ventral surface of head [Australia] *casuarinae* (p. 128)
- At least antennal segments III-V with yellow pedicels; frequently with legs, several antennal segments and anterior half of body pale 8
- 8 Female with very small fore tarsal tooth at base of pretarsus; ocellar setae less than 20 μ m long; antennal segment III stout but sharply constricted at pedicel [Argentina and Falkland Islands] *denticulatus* (p. 128)
- Female without a fore tarsal tooth; ocellar setae more than 30 μ m; antennal segment III tapering to base 9
- 9 Setae B_2 on tergite IX about 0.5 times as long as B_1 [Society Islands] *biformis* (p. 127)
- Setae B_2 on tergite IX as long as or longer than B_1 [Australia] 10
- 10 Antennal segments VI and VII broadly rounded with a sharply slender yellow pedicel *pedicillus* (p. 132)
- Pedicel of antennal segments VI and VII less slender, VI frequently yellow in basal half 11
- 11 Apical third of tube sharply yellow in contrast to black basal two-thirds; femora largely yellow *miskoi* (p. 131)
- Apical third of tube paler than base but not sharply yellow; femora brown but tibiae yellow or brown *mjobergi* (p. 131)
- 12 Body and appendages uniformly dark brown except for pale base of antennal segment III; eyes reduced but rounded and protruding [Australia] *badius* (p. 127)
- Head and pronotum sometimes paler than abdomen, antennae or legs with extensive pale areas; eyes large, if reduced then not round and protruding 13
- 13 Antennal segment IV shorter than segment III [Australia] *capricornis* (p. 127)
- Antennal segment IV longer than segment III 14
- 14 Setae B_1 and B_2 on tergite IX less than 0.5 times as long as the tube, with apices clearly expanded; head and thorax yellow, abdomen brown, antennal segments I and II yellow [Australia] *semirufus* (p. 132)
- Setae B_1 and B_2 on tergite IX more than 0.5 times as long as tube, apices acute or blunt; head and thorax usually as brown as abdomen, if paler then antennal segment II brown 15
- 15 Antennal segments III and IV almost clear yellow, also basal half of V; segment IV about 3.5 times as long as wide; body colour brown, legs yellow [Australia] *magnetis* (p. 131)
- Antennal segments III and IV variously shaded with brown; if pale then segment IV less than 3.0 times as long as wide; body and femora usually dark 16
- 16 Eyes prolonged on ventral surface of head with one large isolated facet; dorsal surface of head and pronotum conspicuously reticulate (Text-fig. 4); antennal segments IV and V with elongate slender pedicels [New Guinea] *grayi* (p. 129)
- Eyes not longer ventrally than dorsally (Text-fig. 2); dorsal surface of head weakly sculptured; antennal segments IV and V with short pedicels (Text-fig. 61) 17
- 17 Eyes reduced to about five facets ventrally; antennal segment III yellow in basal half, sometimes brown in apical half [Australia & New Zealand] *loisthus* (p. 130)
- Eyes with at least ten facets on ventral surface; antennal segment III pale at base and apex, but with a transverse brown band at basal third [Fiji] *fijiensis* (p. 128)

Carientothrips acti Mound

(Text-fig. 60)

Carientothrips acti Mound, 1974 : 25-26. Holotype ♀, AUSTRALIA (ANIC) [examined].

The *acti* group of species includes *japonicus* (Bagnall), *pictilis* Mound, *reedi*

Mound and *vesper* Mound. Both *acti* and *pictilis* are unusual in having the terminal setae on the tube flattened at the apex instead of acute, and in having the pedicel of antennal segment three flared into a ring. However, *japonicus* has the pedicel of segment three slightly thickened, and this probably represents an intermediate condition. These species, apart from *pictilis*, have the epimeral sutures incomplete, and the metanotum bears more than one pair of median setae.

SPECIMENS STUDIED.

Holotype ♀, AUSTRALIA: Australian Capital Territory, Canberra, Black Mt, on dead leafy *Eucalyptus* branches, 3.i.1961 (*E. M. Reed*) (ANIC). Paratypes from New South Wales, A.C.T. and northern Victoria from leaf litter and grass tussocks are listed in detail in Mound (1974).

Carientothrips badius (Hood) comb. n.

Cryptothrips badius Hood, 1918 : 143-144. Holotype ♀, AUSTRALIA: Queensland (USNM) [examined].

Elaphrothrips apterus Girault, 1928 (42) : 2. Holotype ♂, AUSTRALIA: Queensland (QM) [examined]. [Synonymized by Mound, 1974 : 23].

Bolothrips badius (Hood) Hartwig, 1948 : 117.

This species was treated in the genus *Bolothrips* by Mound (1974), but is now removed from that genus because the fourth antennal segment bears four sense cones. However, it is an unusual species with a relatively long head and small rounded eyes which is not closely related to any other known species. *C. badius* is widespread in Australia in grass tussocks, and a detailed list of specimens from Queensland, New South Wales, and Western Australia is given in Mound (1974).

Carientothrips biformis (Moulton) comb. n.

Bolothrips biformis Moulton, 1939 : 146-147. Holotype ♀, TAHITI (BPBM) [not examined].

This species is removed from *Bolothrips* because it has four sense cones on the fourth antennal segment. It is not closely related to the other species of *Carientothrips* but has the maxillary stylets closer together than the species of *Nesothrips*.

SPECIMEN STUDIED.

SOCIETY ISLANDS: Rapa, Mangaoa Pk, 1000-1200 ft, 25.vii.1934 (*E. C. Zimmermann*), 1 ♀ microptera paratype (BMNH).

Carientothrips capricornis (Mound) comb. n.

Bolothrips capricornis Mound, 1974 : 23-24. Holotype ♀, AUSTRALIA: Queensland (ANIC) [examined].

This species was described in *Bolothrips* because of its resemblance to the American species *B. pratensis*. However, the fourth antennal segment bears four sense

cones unlike any species of *Bolothrips*, and *capricornis* is probably most closely related to *Carientothrips semirufus*.

SPECIMENS STUDIED.

Holotype ♀ microptera, AUSTRALIA: Queensland, Townsville, 2 miles west of Saunders Beach, in leaf litter, 21.vii.1968 (L. A. Mound) (ANIC). Paratype ♀ collected with the holotype (BMNH).

Carientothrips casuarinae Mound

Carientothrips casuarinae Mound, 1974 : 26-29. Holotype ♀, AUSTRALIA: New South Wales (ANIC) [examined].

This species, which is known from macropterae as well as apterae, is dark brown but is otherwise similar to *semirufus*. It has been taken on dead *Casuarina* branches at several sites in eastern Australia.

SPECIMENS STUDIED.

Holotype ♀ aptera, AUSTRALIA: New South Wales, Normanhurst (15 miles north of Sydney), on dead *Casuarina* foliage, 1.ii.1959 (E. M. Reed) (ANIC). Paratypes ♀ ♂ and ♀ macropterae from New South Wales listed in detail in Mound (1974).

Carientothrips denticulatus (De Santis) comb. n.

Nesothrips (*Bolothrips*) *denticulatus* De Santis, 1963b : 66. Holotype ♀, ARGENTINA: Tierra del Fuego (Museos de La Plata) [not examined].

This species is removed from *Bolothrips* because it has four sense cones on the fourth antennal segment. It is not close to *Nesothrips* species because the stylets are parallel in the middle of the head, but it seems unlikely to be closely related to the other species of *Carientothrips*. Some of the specimens listed below were identified by Prof. Luis de Santis as *denticulatus*. The fore tarsal tooth of the female is less than 10 µm long, although that of the male is about 30 µm long.

SPECIMENS STUDIED.

EAST FALKLAND ISLANDS: Kidney Is., 55 ♀, 24 ♂ in *Poa flabellatum* tussocks, 29.xi.1967 (E. Holdgate) (BMNH).

Carientothrips fijiensis (Moulton) comb. n.

Bolothrips (*Carientothrips*) *fijiensis* Moulton, 1944 : 306-307. Holotype ♀, FIJI (BPBM) [not examined].

The original description refers to an apterous paratype female, although this specimen is actually micropterous with wing lobes 160 µm long. The eyes of the microptera are reduced and flattened externally as in *loisthus*, although the eyes of the macropterae are large and rounded as in *grayi* described below. The Australian species *mjobergi* is similar to the macropterae of *fijiensis* although with a

shorter head, but the apterae and micropterae of *mjobergi* are much shorter and broader. The pelta of *fijiensis* is similar to that of *grayi*, and the male has a small fore tarsal tooth.

SPECIMENS STUDIED.

FIJI: Vitilevu, Nandarivatu, 2 ♀, 1 ♂ macropterae, 1 ♀ microptera (all paratypes), 9.ix.1938, 1 ♀ macroptera paratype 1.ix.1938; Mt Korobamba, 1 ♀ macroptera paratype 1.viii.1938 (E. C. Zimmermann) (CAS).

Carientothrips grayi sp. n.

(Text-figs 4, 7, 63)

♀ macroptera. Colour dark brown with red internal pigment; tarsi light brown; antennal segments IV and V yellow in basal third, III with yellow pedicel and yellowish brown in apical half otherwise dark brown; fore wings deeply shaded in third and fourth fifth, but clear in apical fifth, basal two-fifths clear with dark longitudinal stripe; major setae almost hyaline, bases of setae at apex of tube dark.

Head longer than wide, projecting in front of large compound eyes, cheeks rounded to base with about four small setae; dorsal surface strongly sculptured; postocellar setae well behind ocelli; maxillary stylets retracted to postocular setae; eyes with one large ventral facet displaced posterior to normal hind margin of eye. Antennae with segment III much shorter than IV; segment VII with a distinct pedicel, VIII slender and slightly constricted at base. Pronotum similarly sculptured to head, with weak median thickening; epimeral sutures complete, setae with blunt apices. Metanotum reticulate, median setae slender, 30 µm long. Fore wing slightly constricted medially; subbasal setae short, duplicated cilia variable. Fore tarsus with no tooth. Pelta reticulate with pronounced lateral wings; setae on tergite IX softly rounded at apex; tube slender with straight sides bearing fine setae.

MEASUREMENTS (holotype ♀ in µm). Body length 3250. Head, length 350; median width 260; postocular setae 65; ocellar setae 35. Pronotum, length 195; median width 320; major setae—am 30, aa ?30, ml ?50, epim 100, pa 70. Fore wing, length 1400; distal width 100; subbasal setae 40, 45, 65; number of duplicated cilia 4–7 (3–6 in one paratype). Tergite VII setae, B_1 70; B_2 100. Tergite IX setae, B_1 160; B_2 190; B_3 155. Tube, length 290; basal and apical width 90, 45; terminal setae 175. Antennal segments length, 55; 65; 95; 125; 120; 77; 58; 35; sense cones on III 75.

SPECIMENS STUDIED.

Holotype ♀, NEW GUINEA: Wau, under bark of *Araucaria cunninghamiana*, 22.ix.1970 (B. Gray) (BMNH).

Paratypes, NEW GUINEA: Wau; 1 ♀, 9.i.1966 (J. Sedlacek); 1 ♀, 6.x.1966 (G. Samuelson) (BPBM).

COMMENTS. This species is very similar to the macropterae of *fijiensis*, although larger and with the eyes prolonged ventrally. In the BPBM collection there is a female from north-western New Guinea, Lake Wissel, with almost uniformly brown antennae and no duplicated cilia on the fore wings, but otherwise very similar to *grayi*. This may represent a further species. The micropterae of *fijiensis* are more slender and very similar to *loisthus*, although a direct comparison of *loisthus* and *grayi* would not suggest any close relationship between these two species.

Carientothrips japonicus (Bagnall) comb. n.

(Text-fig. 62)

Cryptothrips japonicus Bagnall, 1921 : 355-356. Holotype ♀, JAPAN (BMNH) [examined].
Mystrothrips japonicus (Bagnall) Mound, 1968 : 138.

The unique holotype of this species is rather damaged but is difficult to distinguish from the eastern Australian species *reedi* Mound. The third antennal segment is thicker at the base, suggesting the origin of the condition found in *acti* Mound. The apices of the terminal setae on the tube are flattened in *acti* and *pictilis* Mound, but are acute as in most other thrips in *japonicus*, *reedi* and *vesper*.

SPECIMEN STUDIED.

Holotype ♀, JAPAN: Kobe, 23.viii.1916 (*Lewis*) (BMNH).

Carientothrips loisthus Mound

Carientothrips loisthus Mound, 1974 : 29-30. Holotype ♀, AUSTRALIA: South Australia (ANIC) [examined].

This species was based on a single female aptera collected in South Australia, and at that time the holotype was regarded as a distinct species from specimens collected in New Zealand. However there is more difference between the specimens listed below from various localities within New Zealand than there is between some of these specimens and the Australian holotype. For this reason they are all regarded as one species. Large specimens from both North and South Island, New Zealand have the femora brown, whereas the females from Waiwera have the femora almost as yellow as the tibiae. Moreover these small specimens have the head and thorax much paler than the abdomen. The large specimens have very long pronotal setae with acute apices, whereas the small specimens have the epimeral and midlateral setae bluntly rounded at the apex. The holotype is completely apterous but has three ocelli, whereas the New Zealand specimens have a small lobe (15 µm) attached to the lateral corners of the mesonotum, and the lateral ocelli are scarcely indicated. The males are smaller than the females with almost clear yellow legs and a large fore tarsal tooth.

MEASUREMENTS (large New Zealand ♀ in µm). Body length 2700. Head, length 310; median width 225; ocellar setae 85; postocular setae 135; mid-dorsal setae 90-120. Pronotum, length 175; median width 290; major setae - am 80, aa 100, ml 120, epim 130, pa 135. Tube length 195.

SPECIMENS STUDIED.

Holotype ♀, AUSTRALIA: South Australia, Adelaide, Waterfall Gulley, grass by stream, 14.i.1968 (*L. A. Mound*) (ANIC).

NEW ZEALAND: South Island, Greymouth, 1 ♀ on *Juncus*, 12.ix.1972 (*V. F. Eastop*); North Island, Levin, 2 ♀, ix. 1966, 1 ♂, v. 1966, 1 ♀, iv. 1967 (*Manson & Pritchard*); N.I., near Rotorua, 2 ♀, ix. 1972 (*V. F. Eastop*); N.I., Waiwera, 4 ♀,

1 ♂ at base of grasses, viii. 1968 (*L. A. Mound*); N.I., Helensville, 1 ♂, viii. 1968 (*L. A. Mound*) (BMNH).

Carientothrips magnetis Mound

Carientothrips magnetis Mound, 1974 : 30-31. Holotype ♀, AUSTRALIA: Queensland (ANIC) [examined].

This species has the eyes well developed ventrally, but is intermediate between *loisthus* and the *acti*-group of species in the form of the head and epimeral sutures.

SPECIMEN STUDIED.

Holotype ♀, AUSTRALIA: Queensland, 10 miles north of Townsville, on grasses, 20.vii.1968 (*L. A. Mound*) (ANIC).

Carientothrips miskoi Mound

Carientothrips miskoi Mound, 1974 : 31. Holotype ♀, AUSTRALIA: New South Wales (ANIC) [examined].

This species is known only from three females which were collected on two separate occasions at the same site. It differs from *mjobergi* mainly in having the tube brightly bicoloured.

SPECIMENS STUDIED.

Holotype ♀ aptera, AUSTRALIA: New South Wales, Cabbage Tree Creek, 7 miles north of Nelligen, near Bateman's Bay, in leaf litter, 2.ii.1969 (*S. Misko*) (ANIC).

Carientothrips mjobergi (Karny)

Cryptothrips mjobergi Karny, 1920 : 42. Holotype ♀, AUSTRALIA: Queensland (NR) [examined].

Cryptothrips (?) *australicus* Priesner, 1928b : 649-651. Holotype ♀, AUSTRALIA: Queensland (HP) [examined]. [Synonymized by Mound, 1974 : 31.]

Cryptothrips incisus Girault, 1927 (37) : 1. Syntypes 2 ♀, AUSTRALIA: Queensland (QM) [examined]. [Synonymized by Mound, 1974 : 31.]

Bolothrips (*Bolothrips*) *flavitibia* Moulton, 1968 : 117-118. Holotype ♀, AUSTRALIA: Queensland (CAS) [examined]. [Synonymized by Mound, 1974 : 31.]

This species is widespread in Australia and highly variable. The eyes are frequently prolonged ventrally, although this is not true of all populations. The tibiae are usually brown but sometimes yellow, and similarly the colour of the fore wings and antennae apparently varies. The number of duplicated cilia on the fore wing has been found to vary from two to eight even within a single population. The pelta of the macropterae is very similar to that of macropterae of *fijiensis* and *grayi*, but the distinction between a central body and lateral wings is less evident in the pelta of micropterae and apterae. Numerous specimens of this species, or species complex, have been studied from all the States of Australia except Tasmania and the Northern Territories, mainly from *Eucalyptus* dead leaves and branches.

***Carientothrips pedicillus* Mound**

Carientothrips pedicillus Mound, 1974 : 32-33. Holotype ♀, AUSTRALIA (ANIC) [examined].

This species is known only from the holotype. It is very similar to *mjobergi* but has the antennal segments six and seven sharply constricted to a narrow pedicel.

SPECIMEN STUDIED.

Holotype ♀ aptera, AUSTRALIA: Australian Capital Territory, Mt Gingera, in leaf litter, 13.iv.1967 (*E. B. Britton*) (ANIC).

***Carientothrips pictilis* Mound**

Carientothrips pictilis Mound, 1974 : 33-34. Holotype ♀ AUSTRALIA: New South Wales (ANIC) [examined].

The unique holotype of this species is bicoloured as in some species of *Bolothrips*. However, the fourth antennal segment has four sense cones and the maxillary stylets are parallel in the middle of the head.

SPECIMEN STUDIED.

Holotype ♀, AUSTRALIA: New South Wales, Parkes, from *Eucalyptus blakelyi*, 7.viii.1959 (*E. M. Reed*) (ANIC).

***Carientothrips reedi* Mound**

Carientothrips reedi Mound, 1974 : 34-35. Holotype ♀, AUSTRALIA (ANIC) [examined].

This species was described from apterae and one macroptera collected in New South Wales and Australian Capital Territory, as well as one macroptera from southern Queensland. This may be a widespread species because the unique holotype of *japonicus* Bagnall only differs in the detailed structure of the antennae. These two species are related to *acti* Mound in the form of the head and thorax.

SPECIMENS STUDIED.

Holotype ♀ aptera, AUSTRALIA: Australian Capital Territory, Canberra, Black Mt, in grass tussock, 11.xii.1960 (*E. M. Reed*) (ANIC). Paratypes from New South Wales, A.C.T., and Queensland are listed in Mound (1974).

***Carientothrips semirufus* (Girault)**

Elaphrothrips semirufus Girault, 1928(42) : 4. Holotype ♀, AUSTRALIA: Victoria (QM) [examined].

Carientothrips semirufus (Girault) Mound, 1974 : 35.

This apterous species is very similar to the bicoloured specimens of *loisthus* from New Zealand, but has short expanded major setae and the mesonotum is closely transversely striate.

SPECIMENS STUDIED.

Holotype ♀, AUSTRALIA: Victoria, Melton, in tussocks, v. 1928 (*F. E. Wilson*) (QM).

AUSTRALIA: New South Wales, 13 ♀, 10 ♂ all collected south-east from the Blue Mountains and detailed in Mound (1974) (BMNH, ANIC).

Carientothrips vesper Mound

Carientothrips vesper Mound, 1974 : 35-36. Holotype ♀, AUSTRALIA: Western Australia (ANIC) [examined].

The unique holotype of *vesper* is very similar to the apterae of *reedi* but with longer antennae and shorter expanded setae on tergite nine.

SPECIMEN STUDIED.

Holotype ♀, AUSTRALIA: Western Australia, Manjimup, in grass clump, 28.ix.1967 (*L. A. Mound*) (ANIC).

DICERATOTHRIPS Bagnall

Diceratothrips Bagnall, 1908 : 193. Type-species: *D. bicornis* Bagnall, by monotypy.

This genus has been confused with *Dichaetothrips* (Mound, 1968 : 78), but is best restricted to a group of Neotropical species. Most of these species have a pair of elongate antecellar setae, although in some of the smaller species such as *harti* Hood, *delicatulus* Hood, and *setigenis* Hood these setae are reduced. It is to this group of species that *Gastrothrips validipennis* Hood is related.

Large species of *Diceratothrips* have a series of stout spines on the inner surface on the fore femora, at least in the males. The antennae are frequently distinctive, segment three is relatively long, the sense cones on segments three and four unusually short, and segments seven and eight frequently form a single elongate unit. The pronotum is also unusual with no thickening at the anterior margin and very little medially even in large individuals, moreover the anterior third is reticulate and the anterior setae short.

Diceratothrips validipennis (Hood) comb. n

(Text-figs 9, 66)

Gastrothrips validipennis Hood, 1938 : 403-406. Holotype ♀, U.S.A.: Florida (USNM) [not examined].

This is a small species of *Diceratothrips* with the antecellar setae exceptionally reduced.

SPECIMEN STUDIED.

U.S.A.: Florida, Homestead, 1 paratype ♂, on dead branches, 28.xii.1937 (*J. C. Bradley*) (AMG).

DICHAETOTHRIPS Hood

Dichaetothrips Hood, 1914 : 164-165. Type-species: *D. brevicollis* Hood, by monotypy.

The synonymy of this genus and its relationship to *Scotothrips* have been discussed recently by Mound (1974). The Indian species referred to below can be distinguished from *Nesothrips* by the presence of a large fore tarsal tooth in the female as well as the more elongate tube. It is returned to the genus *Dichaetothrips* on account of the elongate postocellar setae.

***Dichaetothrips gloveri* (Ramakrishna & Margabandhu) comb. rev.**

(Text-fig. 8)

Neosmerinthothrips gloveri Ramakrishna & Margabandhu, 1939 : 31-32. LECTOTYPE ♀ INDIA (TNA), here designated [examined].

Dichaetothrips gloveri (Ramakrishna & Margabandhu) Shumsher, 1947 : 204-205.

Nesothrips gloveri (Ramakrishna & Margabandhu) Ananthakrishnan, 1960 : 32-33.

The original description of this species does not designate a holotype, although Shumsher (1947) refers to a holotype in the Zoological Survey of India. The specimen here designated as lectotype bears the original data and is the only member of the type-series still available for study.

The postocellar setae of the lectotype are 55 μ m long, rather longer than the distance between the anterior and posterior ocelli. The fore tarsal tooth is slender and almost as long as the width of the fore tarsus. Unfortunately the specimen is crushed, but in the opinion of the present author further collecting is likely to show that this individual is a small specimen of the species known as *Dichaetothrips usitatus* Ananthakrishnan & Jagadish, 1970 (= *Dichaetothrips indicus* Ananthakrishnan, 1961).

SPECIMEN STUDIED.

Lectotype ♀, INDIA, Numkum, Ranchi, on *Zizyphus jujuba*, 1933 (TVR450) (TNA).

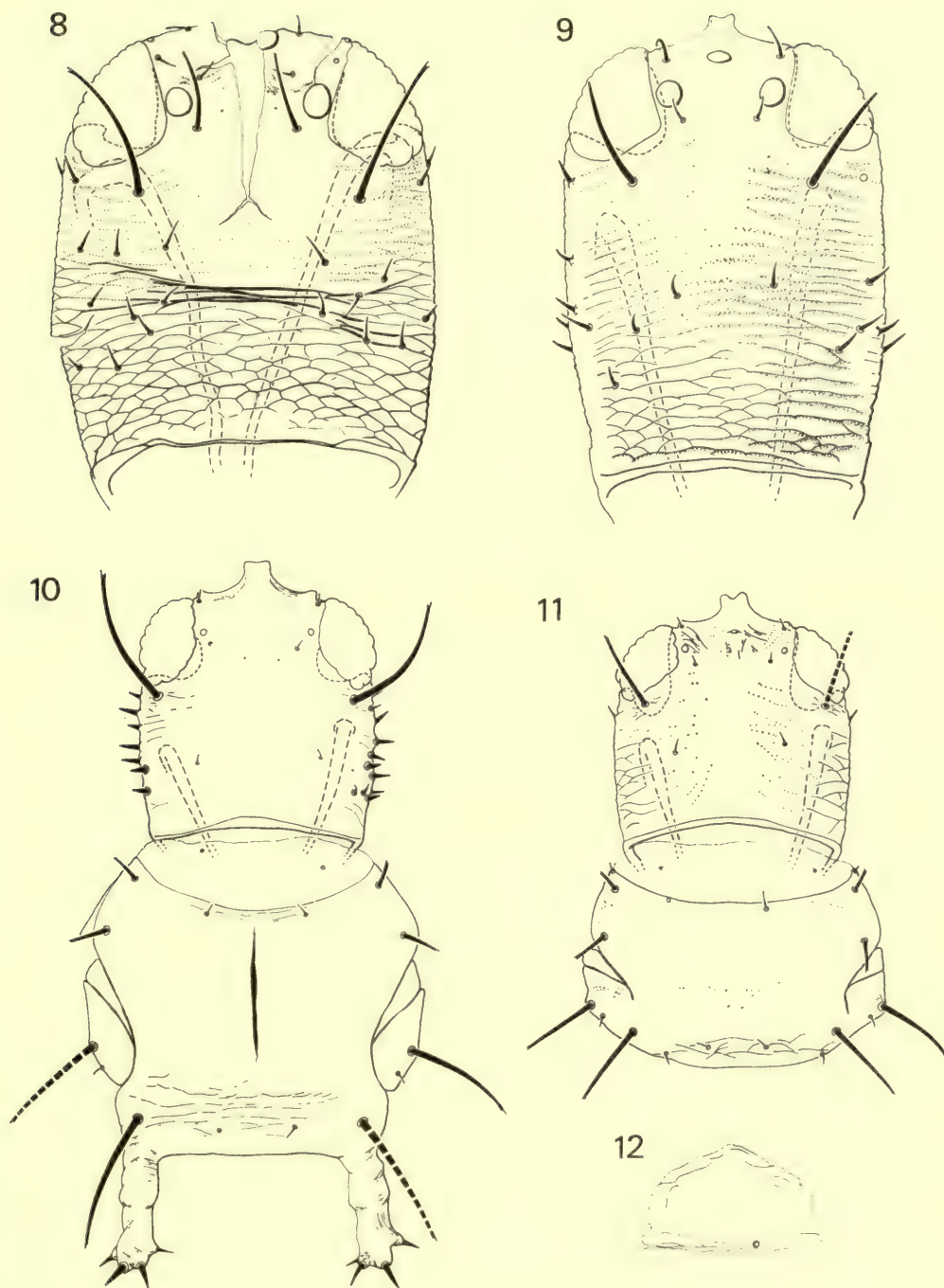
GASTROTHRIPS Hood gen. rev.

Gastrothrips Hood, 1912 : 156. Type-species: *G. ruficauda* Hood, by original designation.

Probolothrips Moulton, 1941 : 319. Type-species: *P. hambletoni*, by monotypy; treated here as a synonym of *abditus*. [Synonymized by Hood, 1952 : 163.]

The genus *Gastrothrips* is used here for a group of nineteen species, mainly from the Neotropics, which have only three sense cones on the fourth antennal segment. The tube is variable in shape, either with straight sides or constricted apically, and frequently much paler than the rest of the abdomen. In contrast the Neotropical species related to *nigrisetis* Hood have four sense cones on the fourth antennal segment (with the exception of *paulistarum*), and the tube is black, frequently with convex sides. These species are treated here under *Neosmerinthothrips*.

The *Gastrothrips* species which have a straight-sided tube comprise a single



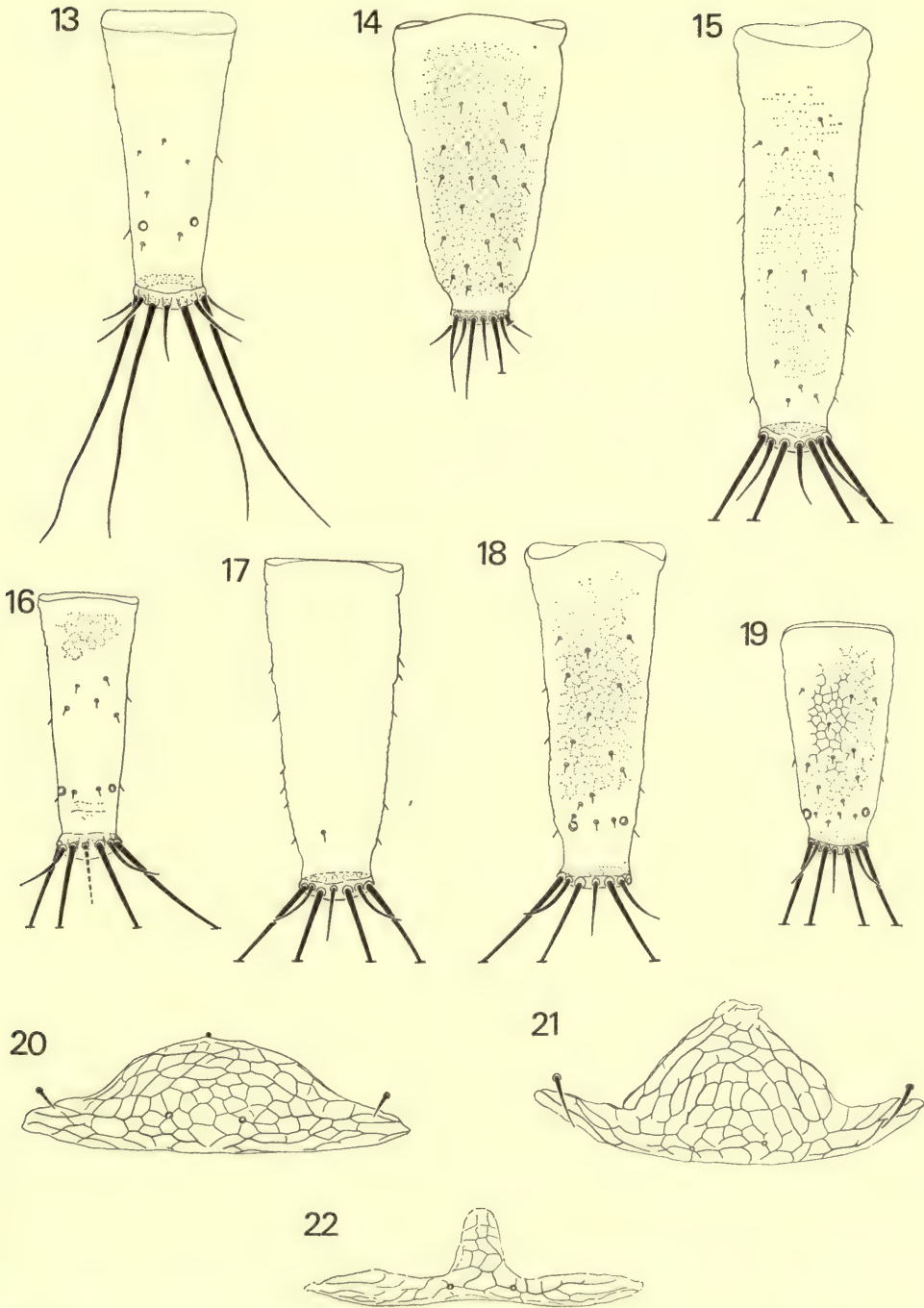
FIGS 8-12. 8, *Dichaetothrips gloveri*. 9, *Diceratothrips validipennis*. 10-12. *Gastrothrips anolis*: 10, large male. 11, female. 12, pelta of female.

species from India, *falcatus* Ananthakrishnan, and a complicated species-group with named forms distributed throughout the tropics, the *acuticornis*-group. All the other *Gastrothrips* species are known only from the Neotropics with a few species extending into temperate latitudes. A major problem with species recognition is the few species that are known from a series of specimens at more than one site. Moreover several species are known from only one morph, aptera, microptera or macroptera, and are therefore difficult to compare with each other. *Cryptothrips citriceps* Priesner, 1921 may also belong in this genus but has not been studied.

GENERIC DEFINITION. Medium sized, usually dark species of Cryptothripini. Head usually rectangular, longer than wide and not projecting in front of eyes; eyes large and usually equally developed on dorsal and ventral surfaces; head rarely wider than long, rarely with cheeks bearing stout setae. Antennae eight-segmented, VIII usually elongate and slender, rarely short and broad; segment IV with three sense cones, III with one or two sense cones. Pronotum transverse, sometimes enlarged in major males, anterior setae usually small, epimeral sutures frequently not complete. Fore tarsal tooth present in ♂, present or absent in ♀. Wings present or absent, duplicated cilia present or absent. Mesonotal anterior angles frequently projecting in major males; metanotal median setae usually well developed. Pelta usually well defined, triangular, with small lateral wings. Tube with straight sides evenly narrowing to apex, or with apex sharply constricted; never with sides strongly convex and not constricted at apex; frequently yellow or paler than rest of abdomen. Males commonly oedymorous.

KEY TO THE SPECIES OF *GASTROTHRIPS*

- 1 Tube with straight sides, not sculptured nor sharply constricted close to terminal setae (Text-fig. 16); tube dark at least in basal half. 2
- Apex of tube sharply constricted in front of terminal setae, tube often sculptured (Text-figs 17-19); basal half of tube frequently yellow or paler than tergite IX 3
- 2 Antennal segment VIII broad at base, scarcely 0.5 times as long as VII (Text-fig. 64); pelta with a small central body and slender lateral wings; fore wings without duplicated cilia *falcatus* (p. 143)
- Antennal segment VIII slender, more than 0.7 times as long as VII; pelta without slender lateral wings; fore wings with duplicated cilia *acuticornis*-group
(see *acuticornis* (p. 139), *mongolicus* (p. 145), *procerus* (p. 147), & *subulatus* (p. 148))
- 3 Basal half of tube yellow or reddish brown, paler than abdominal segment IX 4
- Tube black or dark brown throughout, not paler than tergite IX 9
- 4 Antennal segments I-III largely yellow, paler than the head; tube bright yellow 5
- Antennal segments I-III brown, as dark as head; tube reddish yellow to reddish brown 7
- 5 Pelta small and semicircular, occupying less than 0.5 of anterior margin of tergite II (Text-fig. 12); oedymorous ♂ with pair of elongate tubercles on posterior margin of pronotum *anolis* (p. 142)
- Pelta broadly triangular, occupying at least two-thirds of anterior margin of tergite II (Text-fig. 20) 6
- 6 Antennal segments I and II yellow in sharp contrast to brown segments IV-VIII; head of ♀ with cheeks evenly narrowing to base (Text-fig. 25); ♀ with a fore tarsal tooth *intonsus* (p. 145)
- Antennal segments grade evenly from yellow I to brown VIII, even VII has a pale pedicel; head of ♀ with cheeks parallel except for slight constriction near base; ♀ without a fore tarsal tooth *fulvicauda* (p. 143)
- 7 Head slightly wider than long (210 μ m 195 μ m); mid and hind femora brown but with a yellow area on distal posterior margin *ruficauda* (p. 147)



FIGS 13-22. 13-19. Tube (last abdominal segment): 13, *Bolothrips italicus*. 14, *Gastrothrips intonsus*. 15, *G. mandiocae*. 16, *G. falcatus*. 17, *G. callipus*. 18, *G. abditus*. 19, *G. ruficauda*. 20-22. Pelta: 20, *G. intonsus*. 21, *G. mandiocae*. 22, *G. ruficauda*.

- Head longer than wide; mid and hind femora uniformly brown 8
- 8 Head less than 1.15 times as long as wide; tube more than 0.9 times as long as head
corvus (p. 142)
- Head more than 1.25 times as long as wide; tube less than 0.75 times as long as head
alticola (p. 140)
- 9 Legs and antennal segments I-VI largely yellow; tube 0.7 times as long as head;
apterous with metanotal setae fine and less than 15 μ m long *fulviceps* (p. 144)
- Legs and antennal segments largely dark; tube 0.8 times as long as head or longer;
macropterous or micropterous with metanotal setae more than 30 μ m long and
usually stout 10
- 10 Fore wing with duplicated cilia 11
- Fore wing without duplicated cilia, or micropterous 13
- 11 Female without a fore tarsal tooth; postocellar setae less than the diameter of one
ocellus *abditus* (p. 138)
- Female with a fore tarsal tooth; postocellar setae usually at least 40 μ m long, usually
twice as long as the diameter of one ocellus 12
- 12 Antennal segment III brown with yellow pedicel; sides of tube weakly convex,
curving from base to apex; pronotal anteromarginal setae less than half as long as
anteroangulars; median part of pelta narrowly triangular *stygius* (p. 147)
- Antennal segment III largely yellow, shaded brown at apex; sides of tube parallel
medially or even weakly constricted in anterior third; pronotal anteromarginal
setae as long as anteroangulars; median part of pelta broadly triangular
mandioca (p. 145)
- 13 Fore tarsal tooth of ♀ acute, almost as long as width of fore tarsus *texasus* (p. 148)
- Female without a fore tarsal tooth 14
- 14 Femora brown with yellow area distally on inner margin; sides of tube weakly
convex, curving from base to apex *callipus* (p. 142)
- Femora uniformly brown without a clear yellow area; tube parallel to weakly
constricted medially, or evenly tapering with sides not rounded 15
- 15 Micropterous; tube tapering from base to near apex *monticola* (p. 146)
- Macropterous; tube parallel or weakly constricted medially *fumipennis* (p. 144)

Gastrothrips abditus Hood

(Text-fig. 28)

Gastrothrips abditus Hood, 1935 : 177-182. Holotype ♀, PANAMA: Barro Colorado (USNM) [not examined].

Hoplothrips brasiliensis Moulton, 1938 : 378-379. Holotype ♀, BRAZIL (CAS) [not examined].
[Synonymized by Hood, 1952 : 163.]

Probolothrips hambletoni Moulton, 1941 : 320-321. Holotype ♀, BRAZIL (CAS) [not examined].
[Synonymized by Hood, 1952 : 163.]

Hood described this species from six female and one male macropterae collected from burrows in dead branches. None of these have been studied by the present author, but specimens from the type-series of Moulton's two species have been seen. Apparently *abditus* is widespread in eastern South America, and it is closely related to *mandioca* and *texasus*. There are two undescribed species in the USNM from Mexico which are also related to *abditus*. One of these is macropterous with a heavy tube and dark brown third antennal segment. The other species includes the only hemimacropterous *Gastrothrips* known to the author, and these may

represent *abditus* despite the fact that the wing lobes are shaded. The macropterae of *abditus* have the fore wings pale or only weakly shaded.

SPECIMENS STUDIED.

BRAZIL: Minas Gerais, on dead Manioc stems, 3 ♀, 1 ♂, 21.vii.1933, 2 ♂, 10.iv.1933 (*Hambleton*) (BMNH) [type data of *brasiliensis* and *hambletoni*]. PARAGUAY: Caaguazu, 1 ♂ swept, 1.ii.1964 (*F. Andre*). TRINIDAD: St Augustine, 1 ♂ in empty Psychidae case, 1.xi.1970 (*L. A. Mound*) (BMNH).

Gastrothrips acuticornis (Hood)

Cryptothrips acuticornis Hood, 1925 : 65. Holotype ♀, WEST INDIES: St Croix (USNM) [examined].

Cryptothrips cybele Girault, 1927(38) : 1. Holotype ♂, AUSTRALIA: Queensland (QM) [examined]. [Synonymized by Mound, 1974 : 53.]

Gastrothrips noumeae Bianchi, 1945 : 251-254. Holotype ♀, NEW CALEDONIA (BPBM) [not examined]. [Synonymized by Mound, 1974 : 53.]

Nesothrips acuticornis (Hood); Ananthakrishnan, 1969 : 181-182.

This species has a remarkable distribution and, moreover, it is difficult to distinguish from three other described species: *mongolicus* from Mongolia, *procerus* from Brazil and *subulatus* from Transvaal. Hood described *acuticornis* from several specimens collected on St Croix and Barbados, and in the description refers to small pale males. Ananthakrishnan (1969) recorded both sexes from southern India, and Mound (1974) compared Indian specimens with the West Indian holotype and also specimens from New Caledonia and Australia. The Australian specimens have the eighth antennal segment slightly shorter than the seventh in contrast to the other material studied, and moreover the third antennal segment of most of the Australian specimens is paler than that of either the holotype or the Indian material. However, one female from Kuala Lumpur in Malaya has the third antennal segment dark except for the pedicel as in the holotype, but the eighth segment is short as in the Australian specimens. For these reasons *cybele* and *noumeae* are regarded as the same species as *acuticornis*, despite the fact that the males which have been studied from Australia and New Caledonia are macropterous and brown like the females, whereas the males from India and the West Indies are yellow and micropterous. Large males from India have the posterior margin of the metanotum produced into a dentate fringe which is excavate medially.

The females of *acuticornis* are macropterous with short postocellar setae, and the head of each of the specimens which have been studied is about 1.1 times as long as the tube. However, there are two micropterous females from Basutoland in the Albany Museum, Grahamstown which may represent this species but one has both postocellar setae 30 µm long and the other has these setae 12 µm and 30 µm long. The single male collected with these specimens is also micropterous and slightly oedymorous but has a simple posterior border to the metanotum unlike the small yellow males from India.

Whilst considering the variation in *acuticornis* it is necessary to refer to three other similar species. The South American species *procerus* has a relatively short

tube, the head being 1.5 times as long as the tube in all three of the available specimens. The holotype and one male from southern Brazil have a more slender head than a female from Paraguay, but all three specimens have the third antennal segment light brown with a yellow pedicel, and none of them have elongate postocellar setae. The South African species *subulatus* has the head about 1.4 times as long as the tube and the postocellar setae less than 15 μm long, but the third antennal segment is yellow and the fourth variable yellowish brown. Finally, *mongolicus* has the head 1.2 times as long as the tube, the third antennal segment is yellow in contrast to the dark brown fourth segment, but the postocellar setae are 50 μm long. These three species are known from too few specimens to assess the significance of these differences at present. The form of the pelta differs between them but this may be a function of body size. It is possible that all three are only local populations of *acuticornis*.

SPECIMENS STUDIED.

Holotype ♀ macroptera of *acuticornis*, WEST INDIES: St Croix, swept from grass, 9.iii.1915 (C. B. Williams 553) (USNM 71992). Holotype ♂ macroptera of *cybele*, AUSTRALIA: Queensland, Gympie, in forest, 29.vi.1924 (A. A. Girault).

AUSTRALIA: Queensland, Laidley, 1 ♂, 1 ♀ in forest, 31.v.1923 (A. A. Girault); Q., Grandchester, 1 ♀ (labelled as ♂) in forest, 1.viii.1924 (A. A. Girault) (QM); Q., Moura, 2 ♀ on Rhodes grass, 10.x.1967 (Page & Rigby); Q., 100 miles north of Rockhampton, 1 ♂ in grass, 18.vii.1968 (L. A. Mound) (BMNH).

NEW CALEDONIA: near Noumea, 2 ♀, 1 ♂ paratypes of *noumeae*, beaten from grass, 24.ix.1940 (F. X. Williams) (BMNH, BPBM, HP).

WEST MALAYSIA: Kuala Lumpur, 1 ♀ from live tree, 26.xii.1969 (F. Andre) (BMNH). INDIA: Madras, 4 ♂ on *Barteria* sp. twigs, 18.vii.1969, 3 ♀ on dry Jasmine twig, 25.vii.1966, 1 ♀ from grass, 23.iii.1968; Palghat, 1 ♀, 1 ♂ on dry twig, 12.v.1970; Kumili, 1 ♀ on dry twig, 22.vii.1969; Ronningtonn, 1 ♀ on dry twig, 8.ii.1969 (T. N. Ananthakrishnan) (BMNH).

Gastrothrips alticola Hood

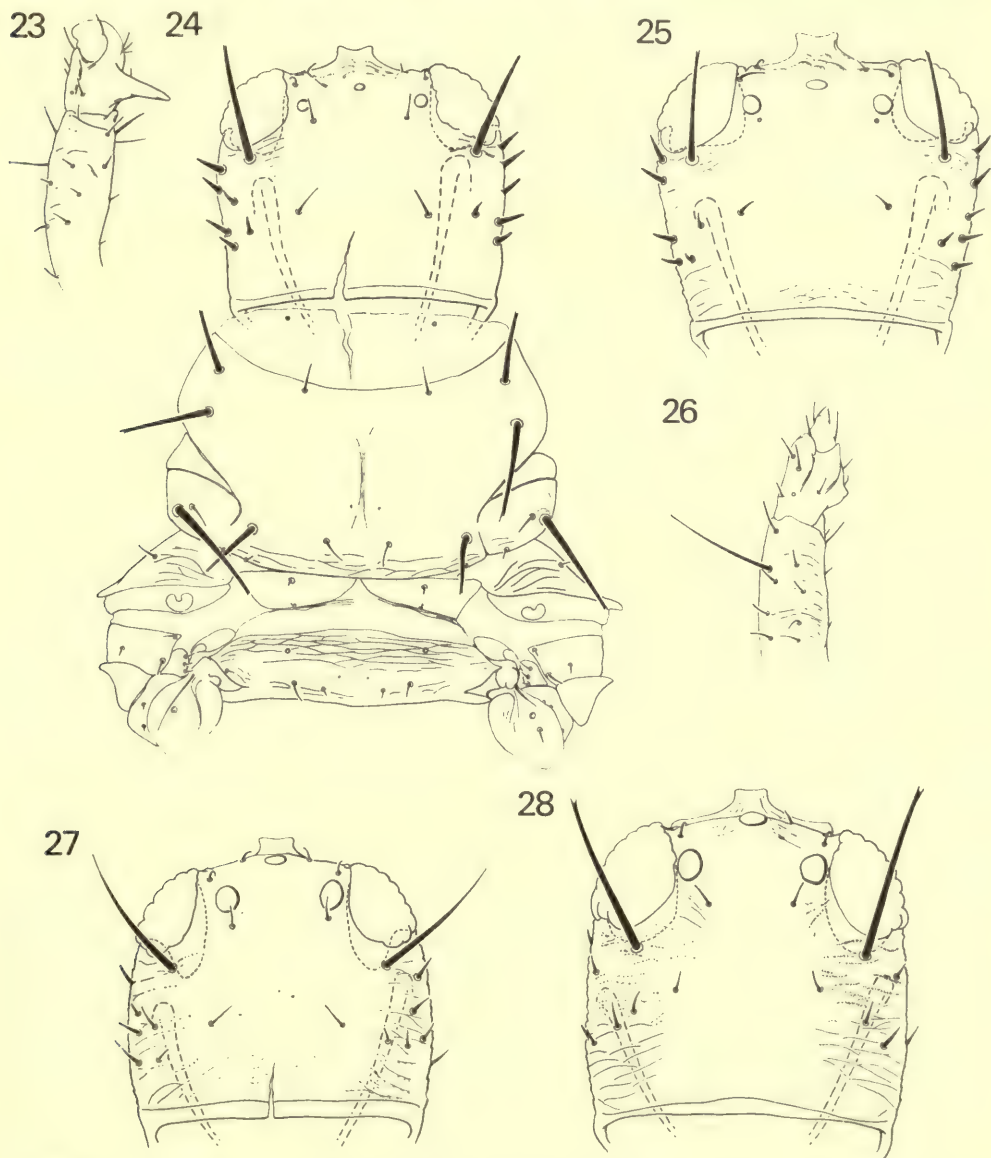
Gastrothrips alticola Hood, 1942 : 570-573. Holotype ♀, PERU (USNM) [not examined].

This species was described from thirty-five apterous females and ten apterous males. Hood states in the description 'basal three fourths of tube blackish brown', whereas the paratypes which have been studied here have the basal three-fourths of the tube paler than tergite nine. This has made comparison with other species particularly difficult. In the key to species above *alticola* will run to *monticola* if the tube is considered to be black. However, *monticola* is known only from micropterae and *alticola* only from apterae. However, both forms were collected in the Department of Huanuco, Peru, at 3000 metres. Moreover, in the BMNH collections there is a single macropterous female which was collected within 100 miles of Huanuco. This female has the basal three fourths of the tube dark reddish brown and paler than tergite nine, the fore wing bears six duplicated cilia, and the

fore tarsus does not bear a tooth. This specimen probably represents *alticola*, and *monticola* may also be the same species.

SPECIMENS STUDIED.

PERU: Dept. Huanuco, Shishmay, 2 ♀ paratypes from shrub with dry branches, at 3000 m, 18.ix.1937 (F. Woytkowski); Pano, 1 ♀, 1 ♂ from dead branches and leaves at 3000 m, 10.ix.1937 (F. Woytkowski) (AMG).



FIGS 23-28. 23-26. *Gastrothrips intonsus*: 23, fore tarsus of small male. 24, small male. 25, female. 26, fore tarsus of female. 27, *G. ruficauda*. 28, *G. abditus*.

***Gastrothrips anolis* Morgan**

(Text-figs 10-12)

Gastrothrips anolis Morgan, 1925 : 7-8. Holotype ♀, PUERTO RICO (USNM) [not examined].
Gastrothrips proteus Hood, 1933 : 417-419. Holotype ♀, PANAMA: Barro Colorado (USNM) [not examined]. [Synonymized by Hood, 1935 : 186.]

Morgan described this species from one female, and Hood described *proteus* from one macropterous and seventeen apterous females with seven apterous males. The tube is bright yellow as in *fulvicauda*, *intonsus* and *ruficauda*, and the head of the major males has spiny cheeks as in *intonsus*. However, the females and the smallest males have a quadrate head similar to several other species of *Gastrothrips*. The major males bear two elongate tubercles on the posterior margin of the pronotum which overhang the metanotum, and Hood (1935 : 185) has published drawings of the variation of this species.

SPECIMENS STUDIED.

PANAMA: Barro Colorado Is., Gatun Lake, paratypes of *proteus*; 1 ♀, 1 ♂ on dead branches, 27.vii.1933, 1 ♀ on dead grass and leaves, 1.vii.1933, 1 ♂ on grass, 14.viii.1933 (J. D. Hood) (AMG). CAYMAN ISLANDS: 2 ♀, 2 ♂ apterae in Nightingale's nest, 16.vii.1962 (A. Ventura) (BMNH).

***Gastrothrips callipus* Hood**

(Text-fig. 17)

Gastrothrips callipus Hood, 1935 : 182-186. Holotype ♀, U.S.A., Texas (USNM) [not examined].

Hood described this species from three female and one male macropterae from Texas, but the species is apparently widespread in the south-eastern part of North America. The femora are bicoloured as in the North American species *ruficauda* and the Central American species *anolis*; however, the tube is black with weakly convex sides. The male listed below from Mexico is identified as *callipus* with some doubt because it is micropterous with the basal three antennal segments yellowish brown.

SPECIMENS STUDIED.

U.S.A.: Texas, Victoria, paratype ♀ on *Chenopodium*, iv. 1908 (J. D. Mitchell) (USNM); T., Sinton, 1 ♀ on dead branches, 20.xii.1967; T., San Antonio, 1 ♀ on dead branches, 23.xii.1967 (F. Andre); Oregon, Ashland, 1 ♀ in berlese funnel, 6.xii.1937 (BMNH); South Carolina, Charleston, 3 ♀ on *Solidago*, 15.vi.1943 (W. S. Fields); Florida, Hialiah, 1 ♀ on grass and weeds, 15.iv.1969 (C. E. Stegmaier). BAHAMA IS.: West Palm Beach, 1 ♀, 13.v.1966 (W. E. Browning). MEXICO: in quarantine at Nogales, 1 ♂ on tomato fruit, 15.iii.1941 (USNM).

***Gastrothrips corvus* Priesner**

Gastrothrips (?) *corvus* Priesner, 1933 : 55-57. Holotype ♀, MEXICO (HP) [examined].

Gastrothrips capitalis Hood, 1935 : 174-177. Holotype ♀, U.S.A.: Texas (USNM) [examined].
Syn. n.

The two unique holotypes of *corvus* and *capitalis* have been compared with each other and *capitalis* is here regarded as a small macroptera whereas the *corvus* holotype is a large microptera. The other differences noted by Hood follow from this morph difference, but it should be noted that in both specimens the basal two-thirds of the tube is dark reddish brown in contrast to the black colour of segment nine. The most closely related species appears to be *monticola* from Peru which has a dark tube.

SPECIMENS STUDIED.

Holotype ♀ microptera of *corvus*, MEXICO: Stadt, im Zimmer, 20.ii.1924 (*A. Dampf*) (HP). Holotype ♀ macroptera of *capitalis*, U.S.A.: Texas, Brownsville, Palm Jungle, in beatings, 20.xi.1911 (*C. A. Hart*) (USNM 71986).

Gastrothrips falcatus (Ananthakrishnan) **comb. n.**

(Text-figs 16, 64)

Nesothrips falcatus Ananthakrishnan, 1968 : 969-971. Syntypes 11 ♀, 5 ♂, INDIA (TNA) [not examined].

The males of this species show extreme allometry. Major males bear several very stout recurved setae on the posterior margin of the fore femora and fore coxae, and the metanotum bears a median process projecting backwards over the pelta. These features are not developed in minor males. Allometry is also known in four other species of *Gastrothrips*, *acuticornis*, *alticola*, *anolis* and *monticola*, although different parts of the body are affected in each species. In most species of Thysanoptera which show allometry the major males are much larger than the minor males, but in *anolis* and apparently *falcatus* the differences in body size are not very great. Unfortunately the measurements published by Ananthakrishnan (1970; 1971) are given as ranges for each character and hence cannot be used to establish correlations.

G. falcatus appears to be related to the *acuticornis*-group in the form of the head and tube, but differs from other members of the genus in having antennal segment eight short and broad. There is one specimen in the BMNH collections from Valparai in southern India which is very similar to *falcatus* in colour and the form of the wings and antennae, but has the tube constricted at the apex, the pelta broadly triangular and the postocellar setae close together.

SPECIMENS STUDIED.

INDIA: from dead twigs; Madras, 1 ♀, ii. 1968, 3 ♀, xi. 1968, 2 ♀, vii. 1969, 1 ♀, xii. 1970; Devikula, 1 ♂, ix. 1970; Goa, 2 ♀, x. 1968 (BMNH).

Gastrothrips fulvicauda Hood

Gastrothrips fulvicauda Hood, 1937 : 277-280. Holotype ♀, PERU (USNM) [not examined].

This species was based on three apterous females, and unlike *ruficauda* the head

is rectangular without any ocelli (Hood, 1937: fig. 4b). The tube is yellowish orange and the distal half of the femora considerably paler than the tibiae. The most closely related species seems to be *alticola* which is also based on apterae from Peru, but these have the first two antennal segments brown and the tube more darkly coloured.

SPECIMENS STUDIED.

PERU: Cajamarca Dept., near Celendin, from bush containing dry branches, 1 paratype ♀ aptera, 1.vi.1936 (*F. Woytkowski*) (USNM).

Gastrothrips fulviceps Hood

Gastrothrips fulviceps Hood, 1937 : 274-277. Holotype ♀, PERU (USNM) [not examined].

This species was described from seven apterous females from Celendin, Peru, and the holotype was collected from a bush containing dry branches and moss. No other member of *Gastrothrips* has a similar colour combination of dark tube but yellowish legs, antennal segments and head. In colour and general shape *fulviceps* is very similar to *Nesothrips propinquus* (Bagnall), but that species has a more transverse head, four sense cones on the fourth antennal segment, a shorter and broader eighth antennal segment, and a differently shaped pelta without a strong subbasal line of sculpture. The head of *fulviceps* is as broad as long, intermediate in shape between that of *ruficauda* and the majority of *Gastrothrips* species.

SPECIMENS STUDIED.

PERU: Cajamarca Dept., Celendin, 1 ♀ paratype on *Alansoa acutifolia* flowers, 2.vi.1936 (*F. Woytkowski*) (AMG). GUATEMALA: Guatemala City, 1 ♀ on *Brunella vulgaris*, 7.v.1945 (*E. J. Hambleton*) (USNM). MEXICO: in quarantine at Brownsville, Texas, 1 ♀ on rose, 6.x.1939; in quarantine at San Francisco, California, 1 ♀ on *Sedum*, 20.iv.1938 (USNM).

Gastrothrips fumipennis Hood

Gastrothrips fumipennis Hood, 1952 : 163. Holotype ♀, BRAZIL (USNM) [not examined].

Hood described this species from three female and seven male macropterae. According to the description large males bear a pair of lateral processes on the mesothorax as in *abditus*, *falcatus* and *acuticornis*. Despite the absence of duplicated wing cilia *fumipennis* is very closely related to *abditus*, although it is rather darker with shaded wings and brown tarsi and third antennal segment.

SPECIMENS STUDIED.

BRAZIL: Santa Catarina, 2 ♂ paratypes on dry branches, 16.v.1949 (*F. Plaumann*) (AMG).

***Gastrothrips intonsus* Hood**

(Text-figs 23-26)

Gastrothrips intonsus Hood, 1941a : 180-183. Holotype ♀ microptera, PERU (USNM) [not examined].

The unique holotype of this species was related by Hood to *picticornis* on account of the shape of the head. However, *picticornis* is treated here in the genus *Neosmerinthothrips* because of the shape of the tube. Moreover the males of *intonsus*, particularly large specimens, have the head with convex spiny cheeks as in *anolis*. These major males, however, do not have the posterior margin of the pronotum produced into tubercles. The females have the head broadest just behind the eyes and strongly tapering to the base, and the pelta is broader than in the male and similar to *fulvicauda* and *alticola*. The bright yellow tube is similar to *anolis*.

SPECIMENS STUDIED.

PERU: Piedras Grandes, at 3000 m, 1 major ♂ (det J. D. Hood) in flowers, 2.xi.1937 (*F. Woytkowski*) (USNM); Huacapistana, 1 ♀ on dry leaves, 12.ii.1940 (*F. Woytkowski*); San Felix, 1 minor ♂ from bush with dry leaves, 25.iii.1940 (*F. Woytkowski*) (BMNH).

***Gastrothrips mandiocae* (Moulton)**

(Text-fig. 21)

Dichaetothrips mandiocae Moulton, 1941 : 321-322. Holotype ♀, BRAZIL (CAS) [examined].
Gastrothrips oeceticola De Santis, 1943 : 92-96. Holotype ♀, ARGENTINA (Museos de la Plata) [not examined]. [Synonymized by Hood, 1956 : 99.]

Hood (1950 : 22-25) redescribed and figured *oeceticola* from southern Brazil, and later synonymized it with *mandiocae* after a comparison of the type-specimens. The postocellar setae are frequently more than 100 µm long, but the female listed below from Paraguay has one of these setae less than 20 µm long. Because of this variation the female listed below from Ghana is identified provisionally as *mandiocae* despite the fact that the postocellar setae are short. The most closely related species are *abditus* and *texanus*.

SPECIMENS STUDIED.

BRAZIL: Minas Gerais, 1 ♀, 1 ♂ in dead Manioc stems, 15.ix.1933 (*Hambleton*) [type data of *mandiocae*]; Vicosia, 3 ♀, 2 ♂ on dead branches, 8.vii & 20.ix.1964 (*F. Andre*) (BMNH). PARAGUAY: Caaguazu, 1 ♀ swept, 2.ii.1964 (*F. Andre*) (BMNH).

GHANA: Accra, Legon, 1 ♀ from *Tapinanthus* on Cacao, 1969 (*P. Room*) (BMNH).

***Gastrothrips mongolicus* (Pelikan) comb. n.**

Nesothrips mongolicus Pelikan, 1965 : 231-233. Holotype ♀, MONGOLIA (TM) [not examined].

This species was described from two females and is discussed under *acuticornis*.

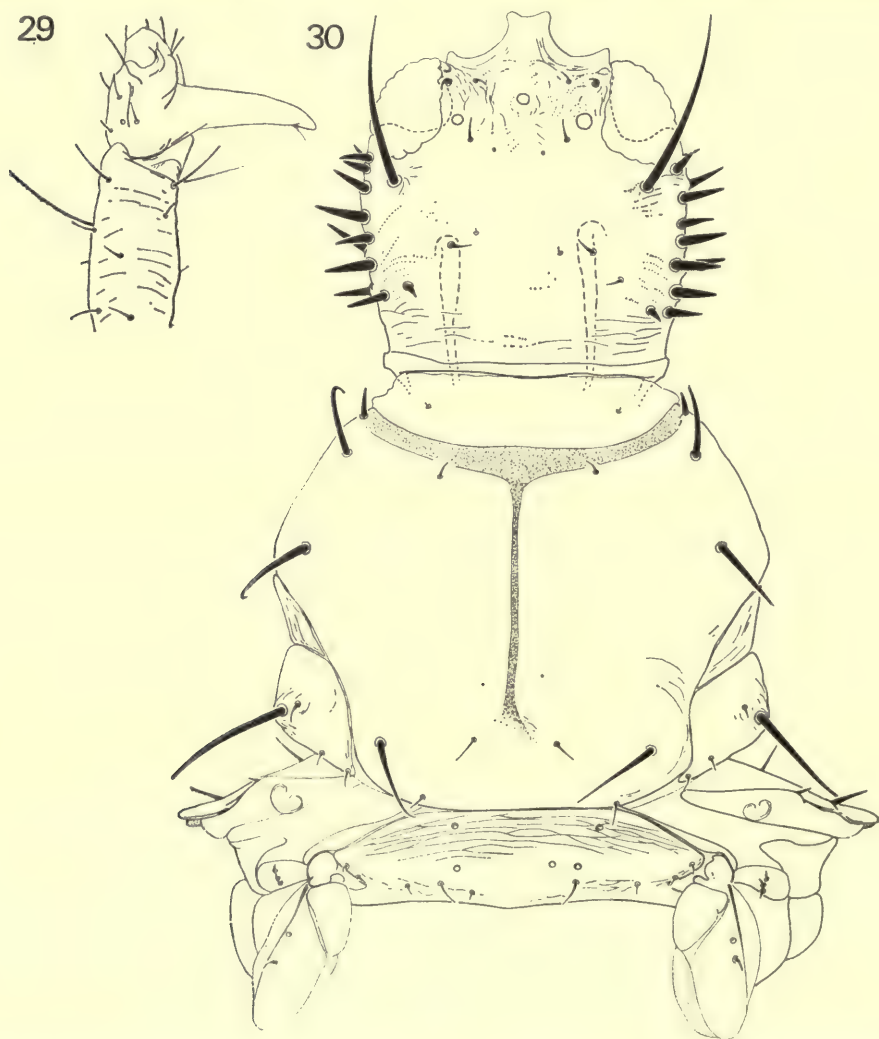
Contrary to the original description the ventral setae on the head are not particularly long in comparison to other members of the *acuticornis* group.

SPECIMEN STUDIED.

MONGOLIA: Koschoo Zaidam, in *Milvus* nest at 1490 m, 1 paratype ♀, 1.vii.1964 (Kaszab) (J. Pelikan collection).

Gastrothrips monticola Hood

Gastrothrips monticola Hood, 1942 : 573-576. Holotype ♀, PERU (USNM) [not examined].



FIGS 29-30. *Gastrothrips intonsus*, large male: 29, fore tarsus. 30, head, pronotum and mesonotum with short wings.

This species was described from two female and one male micropterae, and its possible synonymy with *alticola* is discussed under that species.

SPECIMEN STUDIED.

PERU: Huanuco Dept., Piedras Grandes, 1 ♀ paratype from a bush at 3000 m, 13.xi.1937 (*F. Woytkowski*) (AMG).

Gastrothrips procerus Hood

Gastrothrips procerus Hood, 1956 : 99-100. Holotype ♀, BRAZIL (USNM) [examined].

This species was described from one female macroptera, and is discussed under *acuticornis*.

SPECIMENS STUDIED.

Holotype ♀, BRAZIL: Santa Catarina, on dead branches, v. 1949 (*F. Plaumann*) (USNM 71989). BRAZIL: Parana, Ponta Grossa, 1 ♂ in grass tufts, 14.x.1972 (*V. F. Eastop*). PARAGUAY: Caaguazu, 1 ♀ sweeping, 2.ii.1964 (*F. Andre*) (BMNH).

Gastrothrips ruficauda Hood

(Text-figs 19, 22, 65)

Gastrothrips ruficauda Hood, 1912 : 156-157. Syntypes 3 ♀, U.S.A.: Illinois (USNM) [not examined].

Stannard (1957 : 104-106) records this species from eastern North America. The males have a pointed process in front of the mesothoracic spiracle as in several other species of *Gastrothrips*. The legs are bicoloured as in *callipus*, and the tube is bright yellow as in *anolis*, *fulvicauda* and *intonsus*. This is the type-species of *Gastrothrips* but the head of the female is relatively small with more rounded cheeks than other members of the genus. The only specimen studied was an apterous female with reduced wing-retaining setae but with well developed ocelli.

SPECIMEN STUDIED.

U.S.A.: Virginia, Rosslyn, 1 ♀ from dead willow branch, 1.xi.1914 (*C. B. Williams & J. D. Hood*) (BMNH).

Gastrothrips stygicus Hood

Gastrothrips stygicus Hood, 1935 : 186-191. Holotype ♀, PANAMA: Barro Colorado (USNM) [not examined].

Hood described this species from five female and one male macropterae. The tube is stouter than in *abditus* or *mandioca* with weakly convex margins; however, these three species, together with *texanus*, are closely related. The fore tarsal tooth of *stygicus* is very short and broad, and the postocellar setae are intermediate in length between those of *abditus* and *mandioca*.

SPECIMEN STUDIED.

PANAMA: Porto Bello, 1 ♀ paratype on dead vegetation, 10.vii.1933 (*J. D. Hood*) (AMG).

***Gastrothrips subulatus* (Hartwig) comb. n.**

Bolothrips subulatus Hartwig, 1948 : 113-115. Holotype ♀, SOUTH AFRICA: Transvaal (Pretoria) [not examined].

This species, which was described from 45 ♀ and 5 ♂ collected in Pretoria and one female collected in Lourenco Marques, is discussed under *acuticornis*. The original description refers to macropterous females and 'dealate' females and males. However, the paratypes listed below are micropterae with well developed ocelli and wing retaining setae.

SPECIMENS STUDIED.

SOUTH AFRICA: Transvaal, Pretoria, paratypes; 4 ♀, 1 ♂ on *Bignonia tweediana*, 1.i.1946 (*E. K. Hartwig*) [same data as holotype]; 1 ♀ on *B. tweediana*, 16.ii.1941; 1 ♀ on bean leaves, 6.i.1940 (*E. K. Hartwig*) (BMNH, AMG, HP).

***Gastrothrips texanus* Hood**

Gastrothrips texanus Hood, 1912 : 157-159. Holotype ♀, U.S.A.: Texas (USNM) [examined].

This species is known only from the unique holotype macroptera and one damaged female from the same locality. The pelta is similar to *abditus*, but the fore tarsus bears a tooth and the fore wings do not have any duplicated cilia. Despite this unusual combination of characters the species is closely related to *abditus* and *mandioca*.

SPECIMENS STUDIED.

Holotype ♀, U.S.A.: Texas, Brownsville, on *Acacia farnesiana*, 29.vi.1908 (*C. A. Hart*) (USNM 71990). 1 ♀, 17.ii.1938 (*Anderson*) (USNM).

NEOSMERINTHOTHrips Schmutz gen. rev.

Neosmerinthothrips Schmutz 1913 : 1051. Type-species: *N. fructuum* Schmutz, by monotypy. *Coenurothrips* Bagnall, 1921a : 271. Type-species: *C. brevicollis* Bagnall, by original designation. *Galactothrips* Moulton, 1933 : 404. Type-species: *G. diversicolor* Moulton, by monotypy.

Syn. n.

Stannard (1957) placed this genus in synonymy with *Nesothrips* on the grounds that *fructuum* was closely related to those species of the *Nesothrips* complex 'formerly called *Gastrothrips*'. Unfortunately, Stannard did not indicate in what sense he was using the name *Gastrothrips*, and the present author has removed from *Gastrothrips* to *Neosmerinthothrips* those species which have four sense cones on the fourth antennal segment together with *paulistarum* Hood. The genus *Gastrothrips* is limited in this paper to a group of species of the *Nesothrips* complex with only three

sense cones on the fourth antennal segment. As a result *Neosmerinthothrips* includes eighteen named species which are found in the Oriental, Ethiopian and Neotropical regions. The Oriental and Ethiopian species are more or less closely related, although it is interesting that the fore tarsal tooth is either present or absent. One species from Brazil, *diversicolor*, is probably introduced; it is so similar to the West African *hilaris*. Similarly the West Indian and African species *collaris* is very closely related to the Indian species, *robustus*. However, the *annulipes* group of species, including *picticornis*, *plaumanni*, *paulistarum* and *variipes*, is almost certainly native to Brazil. This is the group of species, together with two species from Panama and one from Fiji, which are here removed from *Gastrothrips*. The genus *Neosmerinthothrips* cannot be defined on any single character, but it includes those members of the *Nesothrips* complex which have a heavy tube with somewhat convex margins and the setae on tergite nine relatively elongate.

GENERIC DEFINITION. Medium-sized black or dark brown species of Cryptothripini. Head variable, longer than wide, or slightly wider than long, stylets V-shaped and wide apart; post-ocellar setae small (except *nigrisetis*), eyes not prolonged ventrally. Antennae eight-segmented; segment VIII either broad or narrowed at base, but never elongate and sharply constricted; segment III with two sense cones, IV with four sense cones (three in *paulistarum*). Pronotum transverse, epimeral sutures complete; oedymorous forms rare; fore tarsal tooth present in ♂ but large, small or absent in ♀. Metanotal median setae usually small and fine; fore wing with duplicated cilia. Pelta broad with lateral wings, lateral setae of tergites VI, VII and IX usually elongate, tube heavy with convex margins or at least with small setal bearing tubercles laterally, rarely almost straight with longitudinal ridges in basal third.

KEY TO THE SPECIES OF *NEOSMERINTHOTHRIPS*

(excluding *inquilinus*, q.v.)

- 1 Antennal segment I yellow, if shaded with brown then distinctly paler than the head 2
- Antennal segment I dark brown, as dark as the head 8
- 2 Fore tarsal tooth absent in ♀ 3
- Fore tarsal tooth present in ♀ 6
- 3 Head at least 1.2 times as long as maximum width (Text-fig. 33); head largely yellow 4
- Head less than 0.95 times as long as maximum width (Text-fig. 32); head dark brown 5
- 4 Pronotal anteroangular and midlateral setae 15 µm long [West Africa] *hilaris* (p. 153)
- Pronotal anteroangular and midlateral setae more than 35 µm long [Brazil] *diversicolor* (p. 152)
- 5 Antennal segments I–III largely yellow; tube more than 1.8 times as long as maximum width [India and Ceylon] *fructuum* (p. 152)
- Antennal segment II brown in basal half, III brown with a yellow pedicel; tube about 1.5 times as long as wide [Brazil] *picticornis* (p. 155)
- 6 Antennal segments IV and V yellow, not darker than III and IV [South Africa] *hoodi* (p. 153)
- Antennal segments IV and V dark brown in contrast to yellow-brown of segment III 7
- 7 Fore tarsal tooth of ♀ less than half as long as width of foretarsus; tube more than 1.7 times as long as maximum width; large species, antennal segment III about 80 µm long [Seychelles] *brevicollis* (p. 151)
- Fore tarsal tooth of ♀ about as long as width of fore tarsus; tube less than 1.6 times as long as maximum width (Text-fig. 36); small species, antennal segment III less than 60 µm long [Java] *xylebori* (p. 155)

- 8 Fore tarsal tooth absent in ♀ 9
 - Fore tarsal tooth present in ♀ but sometimes very small 11
 9 Antennal segment III brown with pedicel yellow *affinis* (p. 150)
 - Antennal segment III yellow, shaded light brown in distal half 10
 10 Fore wing shaded only close to bases of subbasal setae; fore femora largely yellowish brown, darkly shaded along external margin near base [India] *robustus* (p. 155)
 - Fore wing shaded completely across base; fore femora largely dark brown, paler near apex [Africa and West Indies] *collaris* (p. 151)
 11 Fore wings uniformly shaded light or dark brown 12
 - Fore wings not shaded, or shaded at base with median area much paler 13
 12 Fore wing dark brown; major setae in tergite IX exceptionally dark and stout with pale slender apices, B_1 longer than tube; pronotal anteromarginal and anteroangular setae scarcely longer than posterior discal setae [Brazil] *plaumanni* (p. 155)
 - Fore wing light brown; major setae on tergite IX not exceptionally dark and stout, B_1 about half as long as tube; pronotal anteromarginal and anteroangular setae twice as long as posterior discal setae [Fiji] *fijiensis* (p. 152)
 13 Antennal segment IV with three sense cones [Brazil] *paulistarum* (p. 154)
 - Antennal segment IV with four sense cones 14
 14 Fore tarsal tooth well developed, length more than 0.5 of fore tarsal width; head broadest across posterior part of eyes [Brazil] 15
 - Fore tarsal tooth small, length less than 0.25 of tarsal width; head broadest across cheeks [Panama] 16
 15 Second antennal segment brown at base, yellow at apex; femora brown, pale at extreme apices; tube about 2.1 times as long as maximum width *annulipes* (p. 150)
 - Second antennal segment largely yellow; femora yellow in distal third; tube less than 2.0 times as long as wide (Text-fig. 37) *variipes* (p. 155)
 16 Postocellar setae about 2.0 times as long as diameter of one ocellus; apices of femora yellow; major setae on abdomen black *nigrisetis* (p. 154)
 - Postocellar setae about 0.5 times as long as diameter of one ocellus; femora dark brown; major setae on abdomen pale *parvidens* (p. 154)

Neosmerinthothrips affinis (Bagnall) **comb. n.**

Coenurothrips affinis Bagnall, 1921b : 361-362. Holotype ♀, CEYLON (BMNH) [examined].

This species is known from a single crushed specimen which is similar to *collaris* and *robustus* in structure but with the third antennal segment largely dark brown. The fore femur is dark brown along the external margin and yellow along the internal margin. Unlike *brevicollis* the fore tarsus has no tooth.

SPECIMEN STUDIED.

Holotype ♀, CEYLON: among cotton from Hettipold, Ex. Gd., 20.vi.1913 (A. Rutherford) (BMNH).

Neosmerinthothrips annulipes (Hood) **comb. n.**

Gastrothrips annulipes Hood, 1950 : 13-16. Holotype ♀, BRAZIL (USNM) [not examined].

Nesothrips (Gastrothrips) milleforme De Santis, 1963a : 12-14. Holotype ♀, ARGENTINA (Museos de la Plata) [examined]. **Syn. n.**

The head of this species is similar to that of the Brazilian species *variipes* and *picticornis*, but the tube is more slender with nearly straight sides and slightly

constricted near the apex. The other species described from Brazil, *plaumanni*, has the head wider across the cheeks than across the eyes but is otherwise similar, and these four species are all closely related. The holotype of *milleforme* has the distal parts of the major abdominal setae pale not dark, but cannot otherwise be distinguished satisfactorily from the paratype of *annulipes* listed below.

SPECIMENS STUDIED.

Holotype ♀ of *milleforme*, ARGENTINA: Tezanosa Pinto (Prov. Entre Rios), 1957 (*Rosillo*) (Museos de la Plata).

BRAZIL: Rio de Janeiro, Jacarepagua, 1 ♀ paratype of *annulipes*, on dead branches, 21.vi.1948 (*J. D. Hood*) (USNM).

Neosmerinthothrips brevicollis (Bagnall) **comb. nov., stat. rev.**

Coenurothrips brevicollis Bagnall, 1921a : 271-272. Syntypes ♂, ♀, SEYCHELLES (BMNH) [examined].

This species was synonymized in error with *Coenurothrips validus* Bagnall in Mound (1968 : 142), and placed in the genus *Nesothrips* sensu lato. However, *validus*, which is known from a single badly damaged specimen, has a pair of stout interocellar setae and is here placed in the genus *Nesidiothrips*. *N. brevicollis* is very similar to *collaris* and *robustus* although rather smaller. However, it differs not only in having paler basal antennal segments but in having a small slender fore tarsal tooth in the female. In contrast to *hoodi* these three species all have yellowish brown setae in tergite nine.

SPECIMENS STUDIED.

Syntypes. SEYCHELLES: Mahe, 1 ♀, Cascade Estate, top of Mt Serbert, x. 1908-i. 1909 (*H. Scott* 104); 1 ♂, 1908-09 (3. No. 71); 2 ♀, 1908-09 (15 No. 71) (BMNH).

Neosmerinthothrips collaris (Bagnall) **comb. n.**

Cryptothrips collaris Bagnall, 1917 : 26-27. Lectotype ♀, ST. VINCENT (BMNH) [examined].

Gastrothrips fuscicauda Morgan, 1925 : 6-7. Holotype ♂, PUERTO RICO (USNM) [examined].

Syn. n.

Bolothrips marshalli Priesner, 1934 : 58-60. LECTOTYPE ♀, SIERRA LEONE (BMNH), here designated [examined]. **Syn. n.**

Gastrothrips dominicanus Hood, 1935 : 170-174. Holotype ♂, DOMINICA (USNM) [not examined]. **Syn. n.**

Bagnall described *collaris* from two females and Hood described *dominicanus* from two males but there appear to be no significant differences between the specimens. The damaged unique holotype of *fuscicauda* has been compared with the paratype of *dominicanus* as well as the other material listed below. More surprisingly the African specimens described as *marshalli* apparently represent the same species together with the specimen from Mozambique, and moreover Indian specimens referred to as *robustus* Ananthakrishnan can only be distinguished on very

trivial characters. Thus *collaris* appears to be a tramp species which has been distributed by man, possibly during the slave trade.

SPECIMENS STUDIED.

Lectotype ♀, with 1 ♀ paralectotype of *collaris*, ST VINCENT: ?1895 (*H. H. Smith*) (BMNH). Holotype ♂ of *fuscicauda*, PUERTO RICO: from stomach of lizard (*G. N. Wolcott*) (USNM type No. 71987) (labelled ?♀). Lectotype ♀ of *marshalli*, SIERRA LEONE: Njala, inside *Cassava* seedpod, 4.xi.1932 (*E. Hargreaves*), with 1 ♂ paralectotype bearing identical data (BMNH).

DOMINICA: paratype ♂ of *dominicanus*, swept from grass, 13.iii.1915 (*C. B. Williams* 571) (AMG). MOZAMBIQUE: Lourenco Marques, 2 ♀, 4 ♂ in dry *Cassia* pods, vii. 1936 (*J. C. Faure*) (AMG).

Neosmerinthothrips diversicolor (Moulton) **comb. n.**

Galactothrips diversicolor Moulton, 1933 : 404-406. Holotype ♀, BRAZIL (CAS) [not examined].

This is probably only a local and introduced variety of *hilaris* Priesner from West Africa. The only apparent differences are the slightly longer setae on the pronotum.

SPECIMEN STUDIED.

BRAZIL: Bahia, on *Galactia* sp., 1 paratype ♀ (*Bondar*) (BMNH).

Neosmerinthothrips fijiensis (Moulton) **comb. n.**

Gastrothrips fijiensis Moulton, 1944 : 286-287. Holotype ♀, FIJI (BPBM) [examined].

The single specimen from which this species is known has the head rather similar to the *annulipes* group from Brazil and the tube is also similar to *annulipes*. However, the abdominal setae are rather short, the dorsal setae on tergite nine being 145 µm and the tube 260 µm. At present *fijiensis* cannot be placed satisfactorily in any species group. The median part of the pelta is triangular although the lateral wings are well developed.

SPECIMEN STUDIED.

Holotype ♀, FIJI; Navai Mill, Viti Levu at 2500 ft, 16.ix.1938 (*E. C. Zimmerman*) (BPBM).

Neosmerinthothrips fructuum Schmutz

(Text-figs 32, 34, 35, 70)

Neosmerinthothrips fructuum Schmutz, 1913 : 1052-1053. LECTOTYPE ♂, CEYLON (HP), here designated [examined].

Oedemothrips ceylonicus Karny, 1925 : 137-139. Holotype ♀, CEYLON (BMNH) [examined].
Syn. n.

The specimen here designated as lectotype was labelled by Prof. H. Priesner 'Typen material, ex coll. Karny', although the original description does not indicate if more than one specimen existed. This specimen is very faded and partly crushed, but otherwise cannot be distinguished from specimens labelled as '*formosensis* var. *Karny*' by Prof. Ananthakrishnan collected in southern India. The female of the species lacks a fore tarsal tooth. The true *formosensis* is treated here under *Nesothrips*, and has a tube with straight not weakly convex margins.

SPECIMENS STUDIED.

Lectotype ♂ of *fructuum*, CEYLON: Peradenya, in Schoten (*Uzel* 55) (HP). Holotype ♀ of *ceylonicus*, CEYLON: Peradenya, in empty galleries in *Cassia multijuga* with 3 immatures, 1.v.1924 (*F. T. Jepson*) (BMNH).

INDIA: Kerala, Kudal, 1 ♀ in dry twigs, 6.x.1969 (*TNA* 158); Vyithri, 3 ♀, 15.viii.1969; Ranni, 2 ♀, 5.x.1969; Kiruatti, 1 ♂, 19.ix.1969 (BMNH); Sagar, 1 ♀ 20.x.1966 (HP).

Neosmerinthothrips hilaris (Priesner) comb. n.

(Text-fig. 33)

Bolothrips hilaris Priesner, 1937 : 624-626. Holotype ♂, SIERRA LEONE (BMNH) [examined].

The tube of this species is heavy with slightly convex sides bearing distinct setal bases, as in other species of *Neosmerinthothrips*. There are four sense cones on the fourth antennal segment, and segment eight is broad at the base. The eyes are smaller on the ventral than on the dorsal surface, the head does not project in front of the eyes and the ocellar setae are minute. The epimeral sutures are sometimes not quite complete, and the setae on tergite nine are elongate. Despite the colour difference *hilaris* is related to *collaris* and *fructuum* in structure, and the Brazilian species *diversicolor* is probably only a local variant.

SPECIMENS STUDIED.

Holotype ♂, with allotype ♀, SIERRA LEONE: Njala, in twigs of *Bauhinia tomentosa*, 1936 (*E. Hargreaves*); 1 ♀ paratype at same locality on dead branch of *Ficus* (BMNH).

GHANA: near Legon, 11 ♀, 6 ♂ from *Tapinanthus banguensis* on *Cacao* branches, 1969 and 1970 (*P. Room*) (BMNH).

Neosmerinthothrips hoodi (Faure) comb. n.

Gastrothrips hoodi Faure, 1954a : 9-13. Holotype ♀ macroptera dealate, SOUTH AFRICA (Pretoria) [not examined].

This species is very similar to *fructuum* in the shape of the head and tube, and differs mainly in colour and the presence of a pretarsal tooth. Although it was described in *Gastrothrips*, Faure specifically compared it to *fructuum* (as *ceylonicus* Karny) and moreover listed those characters which are here regarded as excluding species from *Gastrothrips* sensu stricto.

SPECIMENS STUDIED.

SOUTH AFRICA: Zululand, St Richards Bay, 1 ♀ mac. paratype on dead branches, 17.ii.1946; Kluhluwe, 4 ♀ dealate paratypes on dead branches of *Syzygium cordatum*, 13.v.1949 (J. C. Faure) (AMG and BMNH).

Neosmerinthothrips inquilinus Ananthakrishnan

Neosmerinthothrips inquilinus Ananthakrishnan, 1960: 32-33. Holotype ♀, INDIA (?TNA) [not examined].

The holotype female and two male paratypes of *inquilinus* cannot be found at present in Prof. Ananthakrishnan's collection (teste T.N.A. in litt.). However, judging from the description this is likely to prove to be a senior synonym of *robustus* q.v.

Neosmerinthothrips nigrisetis (Hood) comb. n.

Gastrothrips nigrisetis Hood, 1935: 161-165. Holotype ♀, PANAMA (USNM) [not examined].

The ocellar setae of *nigrisetis* are very well developed, about 40 µm long and arising well behind a line joining the posterior ocelli. As a result the head and pronotum look very like a species of *Dichaetothrips*, but the tube is unusually heavy with small setal tubercles laterally and the abdominal setae are elongate. This species and *parvidens* are closely related and are probably derived from the *annulipes* group. They are only distantly related to the other species of *Neosmerinthothrips*, although Hood compared them to *collaris* (as *dominicanus*) in the original description.

SPECIMENS STUDIED.

PANAMA: Barro Colorado Island, on dead branches, 3 ♀, 1 ♂ paratypes, 30.vii.1933 (J. D. Hood) (AMG).

Neosmerinthothrips parvidens (Hood) comb. n.

Gastrothrips parvidens Hood, 1935: 165-168. Holotype ♀, PANAMA (USNM) [not examined].

This species is closely related to *nigrisetis* but has very small ocellar setae, and the tube is more slender than any other species of *Neosmerinthothrips*.

SPECIMENS STUDIED.

PANAMA: Barro Colorado Island, on dead branches, 1 paratype ♀, 10.viii.1933 (J. D. Hood) (USNM); Canal Zone, Barro Colorado Is., 1 ♀ on *Swartzia daniensis* fls, 10.v.1939 (Zetek) (USNM).

Neosmerinthothrips paulistarum (Hood) comb. n.

Gastrothrips paulistarum Hood, 1950: 25-27. Holotype ♀, BRAZIL (USNM) [examined].

Because of the antennal sense cone formula this species will come out to *Gastro-*

thrips in the key above. However, it is based on a single specimen which may be aberrant, and it is closely related to the *annulipes* group of species. The tube is dark and heavy with slightly convex margins, and the head shape is intermediate between that of *annulipes* and *parvidens*.

SPECIMEN STUDIED.

Holotype ♀, BRAZIL: Estado de São Paulo, São Carlos, from dead branches, 13.vi.1948 (J. D. Hood & D. P. de Souza Dias) (USNM).

***Neosmerinthothrips picticornis* (Hood) comb. n.**

Gastrothrips picticornis Hood, 1936 : 272–275. Holotype ♀, BRAZIL (USNM) [not examined].

The tube of this species is very broad, rather similar to that of *xylebori* from Java. However, *picticornis* is probably closely related to *plaumanni* and *variipes* which also come from Brazil, but which have a fore tarsal tooth in the female.

SPECIMENS STUDIED.

BRAZIL: Rio de Janeiro, 1 ♀ paratype on dead twigs of *Annona squamosa*, 10.viii.1934 (D. Mendes) [holotype in USNM bears identical data]; State of São Paulo, Itanhaen, 1 ♂ on dead branches, 17.vi.1948 (J. D. Hood & J. Lane) (AMG).

***Neosmerinthothrips plaumanni* (Hood) comb. n.**

Gastrothrips plaumanni Hood, 1950 : 20–22. Holotype ♀, BRAZIL (USNM) [examined].

This is the only South American member of this genus with dark brown fore wings. The abdominal setae are long and dark as in *picticornis* and *variipes*, and the tube is moderately heavy.

SPECIMENS STUDIED.

Holotype ♀, BRAZIL: Sta Catarina, on dry branches, 5.i.1949 (F. Plaumann) (USNM Type No. 71988).

BRAZIL: Vicosia, 2 ♀ on dead branches, 20.xi.1964 (F. Andre) (BMNH).

***Neosmerinthothrips robustus* (Ananthakrishnan) comb. n.**

Nesothrips robustus Ananthakrishnan, 1964 : 102–103. Syntypes ♂, ♀, INDIA (TNA) [not examined].

Contrary to the original description the female of this species does not have a fore tarsal tooth (Ananthakrishnan, 1968 : 972). It is placed in the genus *Neosmerinthothrips* on account of the heavy tube with weakly convex margins bearing small setal bases, and the elongate setae on tergite nine. It is very similar to the widespread species *collaris*, being rather smaller and paler, and may eventually prove to be merely a local variety.

SPECIMENS STUDIED.

INDIA: Madras, 2 ♂, 2 ♀; Goa, 1 ♂; Adar, 1 ♂, 1 ♀; Thenmatai, 1 ♀, all determined by T. N. Ananthakrishnan (BMNH).

Neosmerinthothrips variipes (Hood) **comb. n.**

(Text-figs 37, 73)

Gastrothrips variipes Hood, 1950 : 16-20. Holotype ♀, BRAZIL (USNM) [not examined].

This species is very close to *plaumanni* but the fact that it has rather paler wings and more yellowish basal antennal segments and femora may not be significant when more specimens are collected.

SPECIMENS STUDIED.

BRAZIL: Rio de Janeiro, Jacarepagua, 1 ♀ paratype on dead branches, 22.v.1948 (J. D. Hood & T. Borgmeir); State of São Paulo, São Carlos, 1 ♂ paratype, 15.vi.1948 (J. D. Hood & D. P. de Souza Diaz) (AMG).

Neosmerinthothrips xylebori Priesner

(Text-fig. 36)

Neosmerinthothrips xylebori Priesner, 1935 : 370. LECTOTYPE ♀, JAVA (SMF), here designated [examined].

♀ macroptera. Colour brown, tube blackish; mid and hind femora dark at base and along anterior margin but yellow at apex and posterior margin; fore femora yellow in apical half; antennal segments I and II yellow, III light brown, succeeding segments progressively darker; wings shaded; major setae light brown.

MEASUREMENTS (Lectotype ♀ in μm). Body length 1550. Head, length 175; maximum width 190. Fore wing, length 700; subbasal setae 50, 50, 58; number of duplicated cilia 6-8. Tergite IX setae, B_1 145, B_2 130, B_3 125. Tube, length 190; basal width 115; apical width 35. Antennal segments length 26; 50; 55; 50; 50; 50; 38; 32.

SPECIMENS STUDIED.

Lectotype ♀, JAVA: Tegallega near Tjibadak, 500-600 m, in tunnel of *Xyleborus coffeae* (on *Cacao?*), 30.iii.1925 (Menzel), with 1 ♂ paralectotype (SMF); 2 ♀ paralectotypes with identical data (HP).

COMMENTS. This species was described in a key, complete with collection data but without reference to the number of individuals. The lectotype selected here is the female labelled as holotype by Prof. Priesner which is mounted on a slide with one larva. Despite the long slender fore tarsal tooth of the female it is similar to *fructuum*, although the only available male is hemimacropterous and oedymorous.

NESIDIOTHRIPS **gen. n.**

Type-species: *Nesothrips alius* Ananthakrishnan.

Medium-sized dark brown species of Cryptothripini with males frequently oedymorous.

Head longer than wide or about as wide as long; ocellar setae elongate, arising within the ocellar triangle; postocular setae elongate, major males with two pairs of postocular setae; maxillary stylets wide apart, V-shaped and retracted to postocular setae. Antennae eight-segmented, VIII fairly broad at base; two sense cones on segment III, four sense cones on IV. Pronotum with median thickening, anterior margin thickened in males; fore femora sometimes enlarged, fore tarsal tooth well developed in both sexes. Mesonotal lateral setae small; metanotal median setae frequently stout; fore wing with duplicated cilia; mid and hind femora each with one stout dorsal seta. Pelta with small lateral wings; sigmoid wing retaining setae well developed on tergites III–VI, nearly straight on II and VII; lateral setae on tergites VI and VII elongate, on IX shorter than tube; tube heavy, ridged basally and slightly constricted near apex.

This genus is erected for two species, one from India and the other from the Seychelles and the Solomon Islands. These species are closely related to *Nesothrips* and *Rhaebothrips* species, and the mid and hind femora bear a single stout dorsal seta as in those genera. However, the ocellar setae are elongate and arise within the ocellar triangle, and the fore tarsus bears a large tooth in the female unlike both *Nesothrips* and *Rhaebothrips*.

KEY TO THE SPECIES OF *NESIDIOTHRIPS*

- 1 Setae on tergite IX yellowish brown; midlateral pronotal setae more than $80\text{ }\mu\text{m}$ long in ♀; head slightly longer than tube [India] ***alius*** (p. 157)
- Setae on tergite IX dark brown; midlateral pronotal setae less than $60\text{ }\mu\text{m}$ long in ♀; head slightly shorter than tube [Seychelles] ***validus*** (p. 157)

Nesidiothrips alius (Ananthakrishnan) **comb. n.**

(Text-figs 46, 48, 50, 69)

Nesothrips alius Ananthakrishnan, 1970 : 52–55. Holotype ♀, INDIA (TNA) [not examined].

The original description of this species includes illustrations of the dimorphism. The oedymorous males have a second pair of long postocular setae medially on the vertex which are not developed on females or minor males. The median metanotal setae and the pronotal anteroangulars and midlaterals are also elongate in large males. This species is closely related to *validus* and further collecting may indicate that only one widespread species is involved.

SPECIMENS STUDIED.

INDIA: Aryankavu, 1 ♀, 1 ♂ on dry twiner, 7.x.1969 (T. N. Ananthakrishnan) (TNA) [these data are similar to those published for the type-series – Kerala, Aryankavu, dry twigs, 8.x.1969].

Nesidiothrips validus (Bagnall) **comb. n.**

Coenurothrips validus Bagnall, 1921a : 272–273. Holotype ♀, SEYCHELLES (BMNH) [examined].

The holotype of this species is very badly crushed and the interocellar setae are not readily visible. The species *C. brevicollis* Bagnall is not a synonym of *validus* contrary to Mound (1968 : 142). The specimens listed below from the Solomon

Islands are identified provisionally as *validus*, the males show a similar dimorphism to *alius* but the terminal abdominal setae are dark brown.

SPECIMENS STUDIED.

Holotype ♀, SEYCHELLES: Silhouette [Mare aux Cochons, ix. 1908] (BMNH).

SOLOMON ISLANDS: Guadalcanal, Mt Austen, 2 ♂, 1 ♀ in litter, 19.xi.1963 (*P. Greenslade*) (BMNH).

NESOTHRIPS Kirkaldy

Nesothrips Kirkaldy, 1907 : 103. Type-species: *N. oahuensis* Kirkaldy, by monotypy.

Oedemothrips Bagnall, 1910 : 680. Type-species: *O. laticeps* Bagnall, by monotypy. [Synonymized by Bianchi, 1944.]

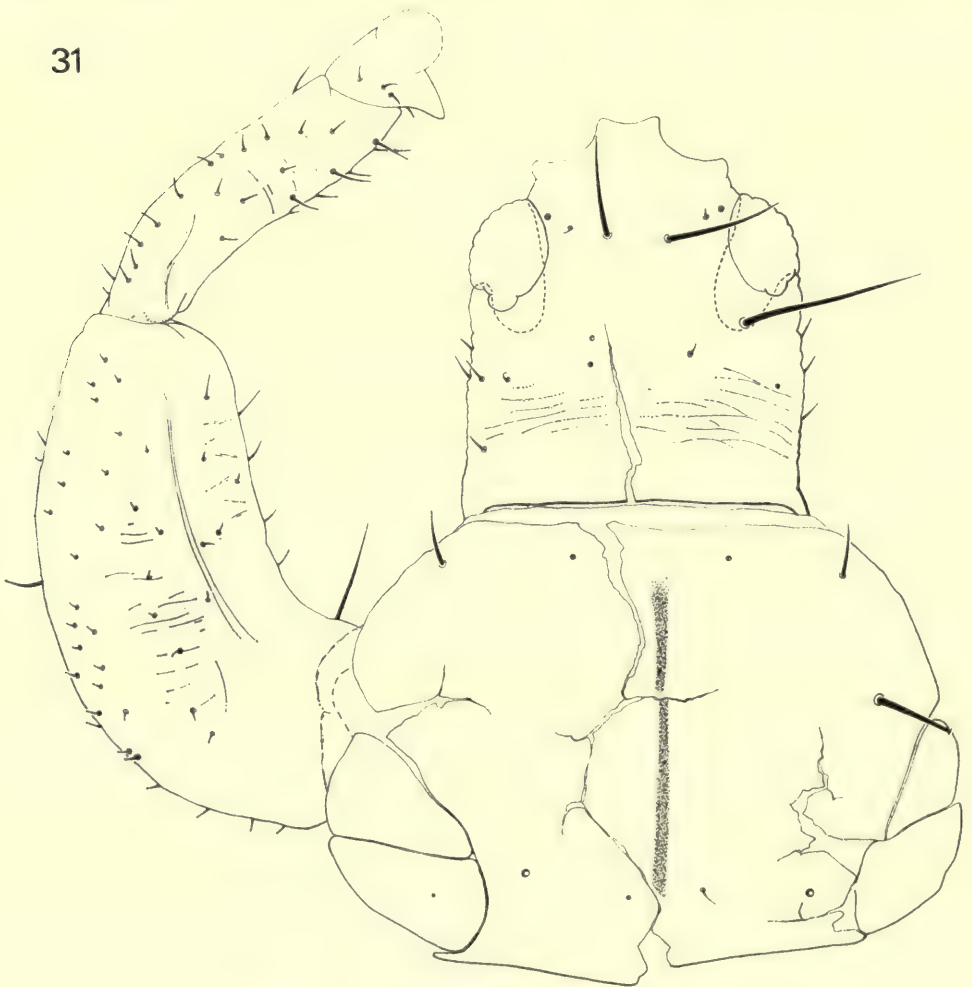


FIG. 31. *Nesothrips oahuensis*, large male.

Oedemothrips is a synonym of *Nesothrips* because the names *laticeps* and *oahuensis* have been shown to refer to the same species. However, the other genera which were placed as synonyms of *Nesothrips* by Stannard (1957) are here withdrawn from synonymy for the reasons given in the introduction and key. Unfortunately this still leaves *Nesothrips* as an unsatisfactory group of fourteen more or less related species from the Pacific, Australia and Indonesia, with two species which have become widespread on trade routes. This group of species is closely related to *Rhaebothrips* through *aoristus* and *oahuensis*, and it is also closely related to *Carientothrips* through *melinus* and *propinquus*. *Neosmerinthothrips fructuum* is sometimes misidentified as *Nesothrips brevicollis* (or one of its synonyms), but the species of *Neosmerinthothrips* have a stout heavy tube with weakly convex instead of straight margins. Similarly, small species of *Scotothrips* and *Dichaetothrips* have been placed in *Nesothrips* despite the fact that they have a more elongate tube.

In the present interpretation *Nesothrips* includes both short broad species such as *oahuensis* and *propinquus*, as well as more elongate species such as *niger* and *yanchepei*. The eyes are prolonged on the ventral surface of the head in some species and in *propinquus* the extent of this prolongation is variable. Duplicated cilia are present on the fore wings of those species in which macropterae are known with the exception of *propinquus* which does not have duplicated cilia. The systematics of this group is not likely to be stabilized without further collecting in the New Guinea and Pacific areas.

GENERIC DEFINITION. Small to medium sized dark species of Cryptothripini. Head frequently wider than long but sometimes longer than wide, usually only weakly extended in front of eyes; eyes variably prolonged on ventral surface; maxillary stylets wide apart and V-shaped. Antennae eight-segmented, two sense cones on segment III, four sense cones on IV; segment VIII short and broad. Pronotum transverse, sometimes enlarged in major males; epimeral sutures complete. Fore tarsal tooth present in ♂, absent in ♀. Wings, when present, usually with duplicated cilia. Metanotal median setae usually small. Pelta with lateral lobes in most species. Tube relatively short, with straight sides.

KEY TO THE SPECIES OF *NESOTHRIPS*

- 1 Antennal segment I yellow or brownish yellow, much paler than VII and VIII and usually paler than the head 2
 - Antennal segment I brown, as dark as the head and distal antennal segments 8
 - 2 Setae B_1 on tergite IX more than 0.8 times as long as the tube; major setae unusually slender; dorsal surface of head with two pairs of elongate postocular setae; mid and hind legs dark brown except for the pale hind margin of femora at extreme apex [Rapa Is.] *semiflavus* (p. 168)
 - Setae B_1 on tergite IX less than 0.7 times as long as tube; major setae stout and dark; head with only one pair of postocular setae; mid and hind legs sometimes yellow, or with apex of femora more or less yellow 3
 - 3 Head more than 1.1 times as long as wide (Text-fig. 38) [Guam] *artocarpus* (p. 161)
 - Head less than 1.0 times as long as wide, usually distinctly wider than long (Text-figs 40–42) 4
 - 4 Posterior margin of hind femora yellow, anterior margin dark brown, fore femora yellow in distal half; eyes not prolonged on ventral surface of head
- Micropterae with anterior margin of head and antennal segments I–V

- yellow or brownish yellow; macropterae and hemimacropterae with head and most of antennal segments IV-V brown [Mascarenes, Indonesia, Japan, Hawaii] (see also *rhizophorae*) **brevicollis** (p. 162)
- Femora coloured differently from above, or with eyes prolonged on ventral surface of head 5
- 5 Tube as long as or a little longer than the head; hind femora dark brown but yellow in distal third; antennal segments I and II yellow, III yellow-brown, IV scarcely paler than V-VIII which are dark brown [Malaya, Sumatra] **malaccaae** (p. 164)
- Tube 0.8 times as long as head or shorter; hind femora largely yellow 6
- 6 Lateral lobes of pelta separate from the median lobe or with only a slender connection, posterior border of pelta eroded medially and separate from anterior border of tergite II [Australia, New Zealand, South Africa] **propinquus** (p. 167)
- Lateral lobes of pelta broadly joined to median lobe, posterior border close to anterior border of tergite II (Text-fig. 45) 7
- 7 Body colour dark brown; postocellar setae finely pointed [Fiji] **fodinae** (p. 163)
- Body colour largely yellow; ocellar setae blunt at apex [Australia] **melinus** (p. 166)
- 8 Ventral length of eyes at least 1.5 times as long as dorsal length [Pacific Is.] 9
- Ventral length of eyes less than 1.2 times dorsal length [Australia] 10
- 9 Ocellar setae 60–80 μ m long, 40–60 μ m apart at base (Text-fig. 31); setae B_1 on tergite IX 90–100 μ m [Hawaii] **oahuensis** (p. 167)
- Ocellar setae 35 μ m long, 80 μ m apart at base (Text-fig. 39); setae B_1 on tergite IX 200 μ m [Marquesas Is.] **niger** (p. 166)
- 10 Pelta semicircular, lateral lobes not developed; head almost transversely oval, broadest across cheeks; pronotum very short, more than three times as wide as long **hemidiscus** (p. 164)
- Pelta with lateral lobes well developed; head not transversely oval; pronotum scarcely twice as wide as long 11
- 11 Setae B_1 on tergite IX 0.6–0.75 times as long as B_2 ; head less than 0.9 times as long as wide; mid and hind femora yellow at apex and along posterior margin in distal third (see also *brevicollis*) **rhizophorae** (p. 168)
- Setae B_1 on tergite IX 1.0–1.2 times as long as B_2 ; head longer than wide; mid and hind femora brown 12
- 12 Setae B_1 on tergite IX 1.2 times as long as B_2 , but less than 0.5 times as long as the tube; major setae including ocellar and metanotal setae exceptionally stout and dark **aoristus** (p. 160)
- Setae B_1 on tergite IX about as long as B_2 , and more than 0.5 times as long as the tube; major setae slender 13
- 13 Antennal segment III brown with pedicel yellow, IV and V dark brown **carverae** (p. 163)
- Antennal segment III largely yellow, shaded near apex, IV and V yellow at base **yanchepi** (p. 170)

Nesothrips aoristus Mound

Nesothrips aoristus Mound, 1974 : 68. Holotype ♀, AUSTRALIA: South Australia (ANIC) [examined].

The oedymorous male of this species has enlarged fore femora similar to *oahuensis*, but the eyes are not prolonged ventrally as in that species. Although the head and fore legs are similar to *Rhaebothrips* species the tube and antennae are relatively short.

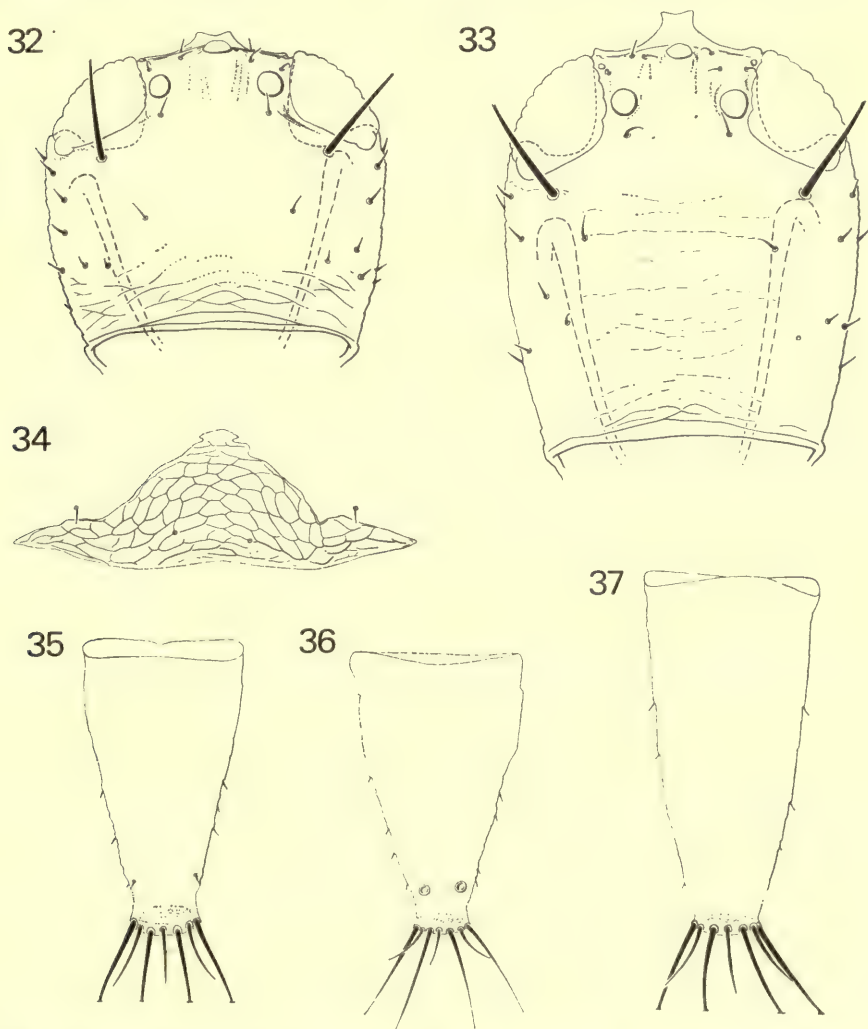
SPECIMENS STUDIED.

Holotype ♀ with 2 ♀, 2 ♂ paratypes, AUSTRALIA: South Australia, south of Adelaide, on *Olearia ramalosa*, 4.xii.1967 (L. A. Mound) (ANIC, BMNH).

Nesothrips artocarpi (Moulton)

(Text-fig. 38)

Bolothrips artocarpi Moulton, 1942 : 14-15. Holotype ♀, GUAM (BPBM) [examined].



FIGS 32-37. *Nesomerinthothrips* species: 32, *N. fructuum*. 33, *N. hilaris*. 34, *N. fructuum*, pelta. 35, *N. fructuum*, tube. 36, *N. xylebori*, tube. 37, *N. variipes*, tube.

This species, described from two females, is similar to *semiflavus* in the shape of the head. The maxillary stylets are retracted into the head as far as the postocular setae, and the postocellar setae are 30 μm long. The metanotum is almost unsculptured around the bases of the median setae, and these setae are slender, 40 μm long and about 45 μm apart. The pelta has well developed lateral wings. The tube is relatively long, 195 μm , with straight sides, and the setae on tergite nine are dark brown with pale acute apices.

SPECIMEN STUDIED.

Holotype ♀, GUAM: on *Artocarpus communis*, 21.v.1936 (Swezey) (BPBM).

Nesothrips brevicollis (Bagnall)

(Text-figs 40, 43, 44)

Oedemothrips (?) *brevicollis* Bagnall, 1914 : 29-30. Holotype ♀, JAPAN (BMNH) [examined].

Coenurothrips minor Bagnall, 1921a : 287-288. Holotype ♀, RODRIGUES (BMNH) [examined].

Syn. n.

Neosmerinthothrips formosensis Priesner, 1935 : 368-370. LECTOTYPE ♀, TAIWAN (HP), here designated [examined]. **Syn. n.**

Neosmerinthothrips formosensis var. *karnyi* Priesner, 1935 : 369-370. LECTOTYPE ♀, JAVA (SMF), here designated [examined]. **Syn. n.**

The name *formosensis* var. *karnyi* has been used by Ananthakrishnan in several publications from Madras (e.g. 1973), but most of the specimens bearing that name from southern India are referred to here as *Neosmerinthothrips fructuum* Schmutz. These specimens have short postocellar setae, the mid and hind femora pale distally, and the tube broad at the base with convex sides. The single specimen listed below from India and bearing Ananthakrishnan's identification as *formosensis karnyi* has a pair of setae between the posterior ocelli 35 μm long, the hind femora yellow along the posterior border, and the tube relatively slender with straight sides.

Bagnall described this species on a single micropterous female from Japan, and Priesner described *formosensis* on two micropterous females from Taiwan (the only whole specimen is here designated lectotype). Bagnall's specimen is slightly larger and crushed but cannot otherwise be distinguished. The variety *karnyi* and the species *minor* were both described from macropterous females, which as is indicated in the key to species have a darker coloured head and median antennal segments. The males listed below from Hawaii are hemimacropterous, wing length 500 μm , and have a similar colour pattern to the macropterae. This also applies to the micropterous female from Mauritius listed below, although this specimen has rather long wing lobes, 125 μm . The Australian species *rhizophorae* is possibly only a local colour variant of *brevicollis*.

In the USNM collections there are three specimens taken in quarantine, apparently from Guam, which have the ocellar setae scarcely 15 μm long and arising just behind a line joining the hind margins of the posterior ocelli. Usually in *brevicollis* the ocellar setae are about 50 μm long and just anterior of a line joining the hind margins

of the posterior ocelli. Mound (1974) refers to similar variation in the position of the ocellar setae in *rhizophorae*.

SPECIMENS STUDIED.

Holotype ♀ of *brevicollis*, JAPAN: Okinawa, Luchu Is., v. 1913 (J. E. A. Lewis) (BMNH). Lectotype ♀ of *formosensis*, TAIWAN: Hookotoo, Makoo, 5.vi.1930 (S. Minowa) (HP), with a damaged ♀ paralectotype on the same slide. Lectotype ♀ (labelled holotype) of *formosensis* var. *karnyi*, JAVA: Tjibodas, 1400 m, 1923 (Karny) (SMF). Holotype ♀ of *minor*, RODRIGUES: vii-xi. 1918 (H. J. Snell & H. P. Thomasset) (BMNH).

MAURITIUS: De Pouce Mt, 1 ♀, 1 ♂ micropterae on leaves, 2.xi.1939 (R. Mamet) (HP). REUNION: St Louis, 1 ♀ macroptera on tobacco, 14.vii.1951 (J. R. Williams) (BMNH).

INDIA: Aryankavu, 1 ♀ macroptera on dry twig, 19.vii.1969 (Ananthakrishnan) (BMNH); Pachmarki, 1 ♀, 20.xi.1966 (Ananthakrishnan) (HP).

HAWAII: Pupukea, 8 ♀, 2 ♂ on *Leucaena*, 16.xii.1969; Barbers Point, 2 ♀, 6 ♂, sweeping and on *Desmanthus*, 16.xii.1969 (F. Andre) (BMNH).

Nesothrips carverae Mound

Nesothrips carveri Mound, 1974 : 71. Holotype ♀, AUSTRALIA: South Australia (ANIC) [examined].

The holotype of this species was collected at Adelaide, but the original description lists specimens from Western Australia, Victoria and the Australian Capital Territory. The nomen nudum '*Oedemothrips nigricans* Bagnall' in Kelly & Mayne (1934 : 51) refers to this species. The most closely related species is *yanchepi* with which *carverae* has been collected in Western Australia near Perth.

SPECIMENS STUDIED.

AUSTRALIA: South Australia, Adelaide, holotype ♀ on washing, 15.x.1967 (M. Carver) (ANIC). A complete list of specimens is given in Mound (1974).

Nesothrips fodinae sp. n.

♀ macroptera. Head, thorax and abdomen dark brown, legs brownish yellow with the morphological upper surface of all femora deeply shaded at the base, coxae dark brown, tarsi yellow; antennal segments I-VI yellow, VII and VIII light brown; wings strongly shaded, particularly at base; major setae dark brown.

Head broader than long, weakly projecting in front of eyes, postocular setae acute; postocellar setae close to inner margin of each posterior ocellus; eyes prolonged on ventral surface. Antennal sensoria rather slender, two sense cones on III, four sense cones on IV; basal pedicel of segment VII broad. Pronotum with a weak median thickening; anterior setae reduced, posterior setae acute; fore femora moderately expanded. Metanotum apparently not sculptured medially, median setae slender and acute, 20 µm long. Pelta with broad lateral wings; tergal wing retaining setae reduced on II, sigmoid on III-VII; dorsal and lateral setae on tergite IX short; sides of tube almost straight.

MEASUREMENTS (holotype ♀ in μm). Body length 1850. Head, length 175; maximum width 210; basal width 175; postocular setae 50; postocellar setae 23. Pronotum, length 115; median width 230; major setae – aa, am, ml, 16, epim 58, pa 30–35. Fore wing, length 750; distal width 60; subbasal setae 35, 75, 90; number of duplicated cilia 9. Tergite VII setae, B_1 130; B_2 95. Tergite IX setae, B_1 55; B_2 52; B_3 70. Tube, length 135; basal width 70; apical width 32; terminal setae 110. Antennal segments length (paratype ♀), 27; 50; 67; 58; 55; 52; 36; 27.

♂ macroptera. Head and thorax brown, abdomen dark brown; legs yellow with small brown markings particularly at base of femora; otherwise similar to ♀. Fore femora strongly swollen, fore tibiae stout, fore tarsi with a stout tooth. Pronotum enlarged, anterior margin and median line strongly thickened; midlateral setae elongate. Metanotal setae 70 μm long.

MEASUREMENTS (paratype ♂ in μm). Body length 1800. Head, length 170; maximum width 187; postocular setae ?90. Pronotum, length 195; median width 250; major setae – am 20, aa 25, ml 100, epim ?80, pa ?60. Fore wing, length 650; subbasal setae 55, 100, 160; number of duplicated cilia 7. Tergite IX setae, B_1 70; B_2 60; B_3 120. Tube length 135.

SPECIMENS STUDIED.

Holotype ♀, FIJI: Lau, in [?palm leaf] mines of *Promecotheca reichei* (Hispididae), ii. 1932 (R. W. Paine) (BMNH).

Paratypes, 2 ♀, 4 ♂ collected with the holotype, also several immatures of first, second and fifth instar.

COMMENTS. This species is readily distinguished by the dark body with pale legs and antennae. *N. propinquus* is similar in head shape and form of the eyes, but has a different pelta and usually has a paler head and thorax. The males of *propinquus* are apterous. The males of *fodinae* are interesting not only because they are macropterous, but also because of the sexual dimorphism in the lengths of the setae on the head, thorax and wings. The postocellar setae vary from 23–30 μm but the series is too short to establish whether these also are subject to sexual dimorphism.

Nesothrips hemidiscus Mound

Nesothrips hemidiscus Mound, 1974 : 71–72. Holotype ♀, AUSTRALIA: Queensland (ANIC) [examined].

The D-shaped pelta of this species is unique in the genus.

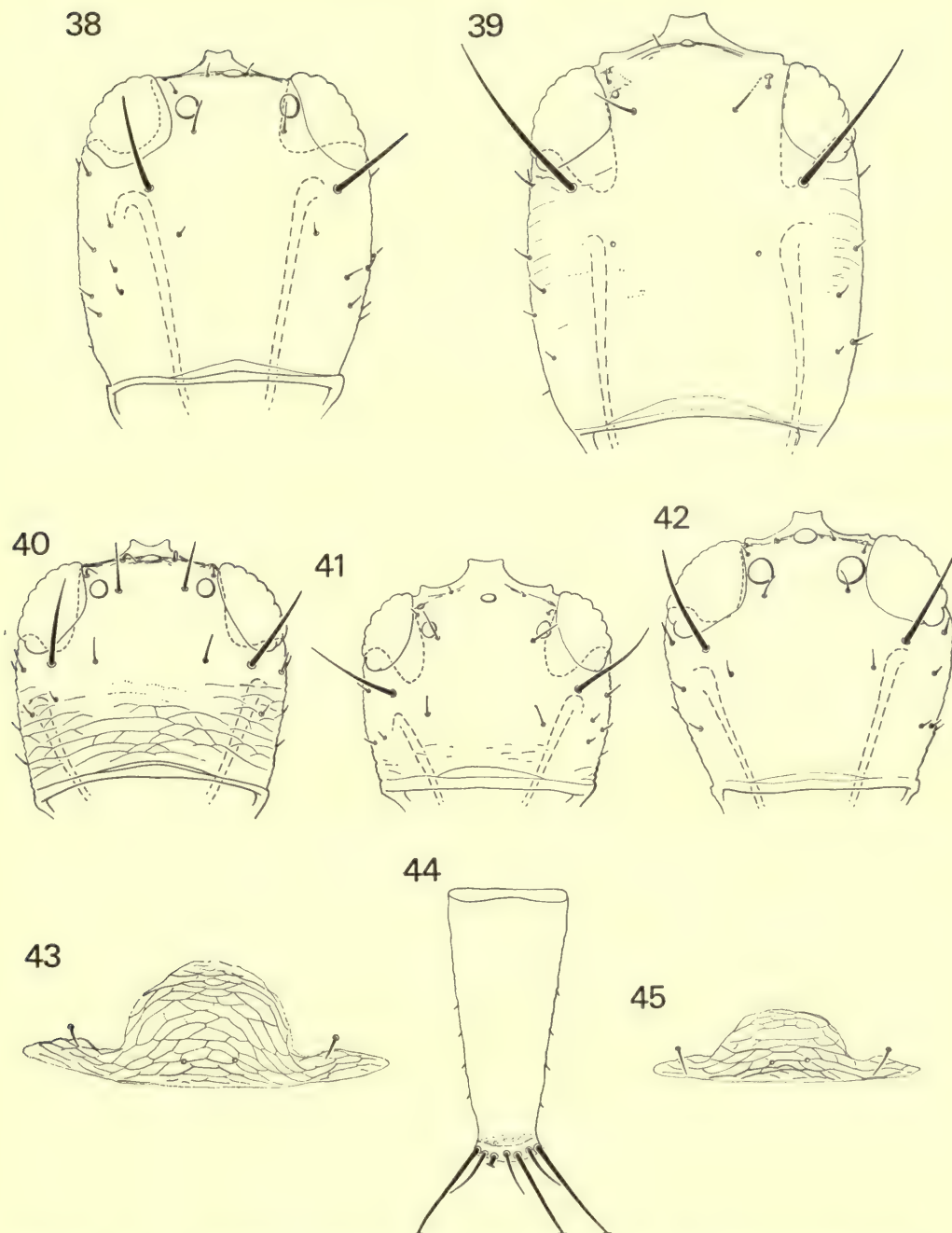
SPECIMENS STUDIED.

Holotype ♀ with 7 ♀, 2 ♂ paratypes, AUSTRALIA: Queensland, near Mareeba, on dead *Casuarina* twigs, 23.vii.1968 (L. A. Mound) (ANIC, BMNH).

Nesothrips malacca sp. n.

(Text-fig. 42)

♀ macroptera. Body and legs dark brown, head and abdomen blackish, all femora yellow in distal third; antennal segments I and II yellow, III light brown with yellow pedicel, IV–VIII dark brown; major setae black; fore wings deeply shaded, particularly at base, with one longitudinal dark stripe.



FIGS 38-45. *Nesothrips* species: 38, *N. artocarpi*. 39, *N. niger*. 40, *N. brevicollis*. 41, *N. fodinae*. 42, *N. malaccaae*. 43, *N. brevicollis*, pelta. 44, *N. brevicollis*, tube. 45, *N. fodinae*, pelta.

Head broadest behind eyes, cheeks rounded and narrowed to base with two pairs of fine setae; dorsal surface not sculptured; postocellar setae arise behind the posterior ocelli; postocular setae almost acute; maxillary stylets wide apart, retracted to postocular setae; eyes not prolonged on ventral surface. Antennae typical of genus, two sense cones on segment III, and four sense cones on IV; VIII not constricted at base. Pronotum transverse, epimeral sutures complete; anteromarginal setae slender and acute, remaining setae stout and bluntly acute. Metanotum with a pair of slender setae medially. Pelta with broad lateral wings; tergal wing retaining setae well developed on II-VII; lateral setae exceptionally long on VII; tube with straight sides.

MEASUREMENTS (holotype ♀ in μm). Body length 1900. Head, length 210; maximum width 215; basal width 150; postocellar setae ?20; postocular setae 80. Pronotum, length 105; median width 225; major setae - am 35, aa ?20, ml 35, epim 80, pa 50. Fore wing, length 760; distal width 70; subbasal setae 50, 80, 100; number of duplicated cilia 9. Tergite IV setae, B_1 100; B_2 55. Tergite VII setae B_1 175; B_2 210. Tergite IX setae, B_1 160; B_2 145; B_3 160. Tube, length 210; basal width 95; apical width 42; terminal setae 130. Antennal segments length, 30; 50; 68; 64; 58; 55; 39; 26.

SPECIMENS STUDIED.

Holotype ♀, WEST MALAYSIA: Kuala Lumpur, on dead branch, 29.xi.1969 (R. G. & F. Andre) (BMNH).

Paratypes. WEST MALAYSIA: 1 ♀ with data similar to holotype except 24.xii.1969 (BMNH). SUMATRA: Fort de Kock, 920 m, xi. 1920 (Jacobson) (SMF) [this paratype bears a manuscript name].

COMMENTS. This species appears to be related to *brevicollis* and *rhizophorae* but has the dorsal setae (B_1) on tergite nine elongate, and all the femora dark brown with a sharply yellow apex. The paratype female from Sumatra is larger than the two specimens from Malaya (body length 2400 μm), and was designated holotype of an unpublished name by Dr H. Priesner.

Nesothrips melinus Mound

Nesothrips melinus Mound, 1974: 72-73. Holotype ♂, AUSTRALIA: Queensland (ANIC) [examined].

This species was described from four males collected in northern Queensland, Australia, although a fifth male from southern New South Wales may represent the same species. These males are largely yellow, and in structure appear to be intermediate between *Nesothrips* and the *Carientothrips* species of the *mjobergi* complex.

SPECIMENS STUDIED.

Holotype ♀ with 3 ♂ paratypes, AUSTRALIA: Queensland, near Ingham, on dead twigs, 21.vii.1968 (L. A. Mound) (ANIC, BMNH).

Nesothrips niger (Moulton & Steinweden)

(Text-fig 39)

Bolothrips nigra Moulton & Steinweden, 1932 : 167-168. Holotype ♀, MARQUESAS IS. (BPBM) [examined].

This species is known only from the unique holotype which is mounted under a broken cover glass. Because of this its relationships cannot be determined at present. Contrary to the original description the lengths of the tube and B_1 setae on tergite nine are 260 μm and 210 μm .

SPECIMEN STUDIED.

Holotype ♀, MARQUESAS IS.: Hiva Oa, Mt Temetiu, 24.vii.1929 (Adamson & Mumford) (BPBM).

Nesothrips oahuensis Kirkaldy

(Text-fig. 31)

Nesothrips oahuensis Kirkaldy, 1907 : 103. Syntype ♀, HAWAIIAN IS.: Oahu (?BPBM) [not examined].

Oedemothrips laticeps Bagnall, 1910 : 680–681. Syntypes ♂, ♀, HAWAIIAN IS.: Oahu, Lanai (BMNH) [examined]. [Synonymized by Bianchi, 1944.]

Nesothrips hawaiiensis, lapsus for *oahuensis* Kirkaldy, Bianchi, 1944 : 31–38.

Bianchi studied a male and female specimen from Kirkaldy's original material and illustrated these. The present author has examined only two female and one oedymorous male syntypes of *laticeps*. The illustration given by Bianchi clearly refers to a rather small male with the fore femora weakly swollen. The male illustrated here has a greatly enlarged fore femur which is L-shaped as in *Rhaebothrips* species. Moreover the head is prolonged in front of the eyes and the ocellar setae are rather close together. The pelta of this specimen is very broad and slender.

SPECIMENS STUDIED.

1 ♂ syntype of *laticeps*, HAWAIIAN ISLANDS: Oahu, near Honolulu, 2000–3000 ft, vii. 1900 (*Perkins* 667); 1 ♀ syntype, HAWAIIAN ISLANDS: Lanai, 2000 ft, i. 1894 (*Perkins* 91); 1 ♀ syntype without data (*Perkins* 489) (BMNH).

Nesothrips propinquus (Bagnall)

Oedemothrips propinquus Bagnall, 1916 : 408–409. Holotype ♀, AUSTRALIA: Victoria (BMNH) [examined].

Cryptothrips dimidiatus Hood, 1918 : 145–146. Holotype ♀, AUSTRALIA: Queensland (USNM) [examined]. [Synonymized by Mound, 1968 : 141.]

Oedemothrips propinquus var. *breviceps* Bagnall, 1924 : 634–635. Syntype ♀, NEW ZEALAND (BMNH) [examined]. [Synonymized by Mound, 1968 : 141.]

Oedemothrips propinquus form *obscuricornis* Bagnall, 1924 : 635.

Bagnalliella cestosa Karny, 1920 : 41. Holotype ♀, AUSTRALIA: Queensland (NR) [examined]. [Synonymized by Mound, 1974 : 73.]

Neosmerinthothrips oleriae Moulton, 1949 : 492–494. Holotype ♀, SOUTH AFRICA (CAS) [not examined]. [Synonymized by Mound, 1968 : 141.]

Bolothrips similis Hartwig, 1948 : 103–108. Holotype ♀, SOUTH AFRICA: Pretoria [not examined]. **Syn. n.**

In addition to the above synonymy the nomen nudum '*Oedemothrips australis* Bagnall' in Kelly & Mayne (1934: 51) also refers to this species. The species is widespread and common in Australia and New Zealand, as well as in South Africa, and has been recorded from St Helena and New Caledonia. Material from all these localities is available in the BMNH collections, together with paratypes of *oleriae* and *similis*. In the USNM collections there are three females taken in quarantine at Boston apparently from the Azores and Portugal. Moreover in the BMNH collections there is one female apparently collected at Curitiba in southern Brazil, but this is the only Neotropical record and needs further confirmation.

Males and most females of *propinquus* are apterous but female macropterae are collected occasionally. The variation in head shape in Australia includes the form shown by *similis*, and the ventral prolongation of the eyes is not constant. In a few gynaeceoid males the eyes are not elongate ventrally. The colour of the legs and antennae is also variable, and the form *obscuricornis* has the legs and antennae largely brown. The anterior setae of the pronotum also vary in length from 15 to 60 μm , but there is no evidence from all this variation that more than one species is involved. Populations from New Zealand appear to show the greatest degree of variation.

Nesothrips rhizophorae (Girault)

Cryptothrips rhizophorae Girault, 1927(38) : 2. Syntype ♀ ♂, AUSTRALIA: Queensland (QM) [examined].

Nesothrips rhizophorae (Girault) Mound, 1974 : 74-75.

This species is very similar to *brevicollis* (Bagnall) and may be merely a local colour variant with the basal antennal segments brownish instead of yellow.

SPECIMENS STUDIED.

AUSTRALIA: Queensland, Brisbane, 3 ♀, 1 ♂ syntypes from galls on mangrove, 28.vi.1927 (*L. Franzen*) (QM); Brisbane, Mt Nebo, 1 ♀ from shrubs, 27.vii.1968 (*L. A. Mound*) (BMNH).

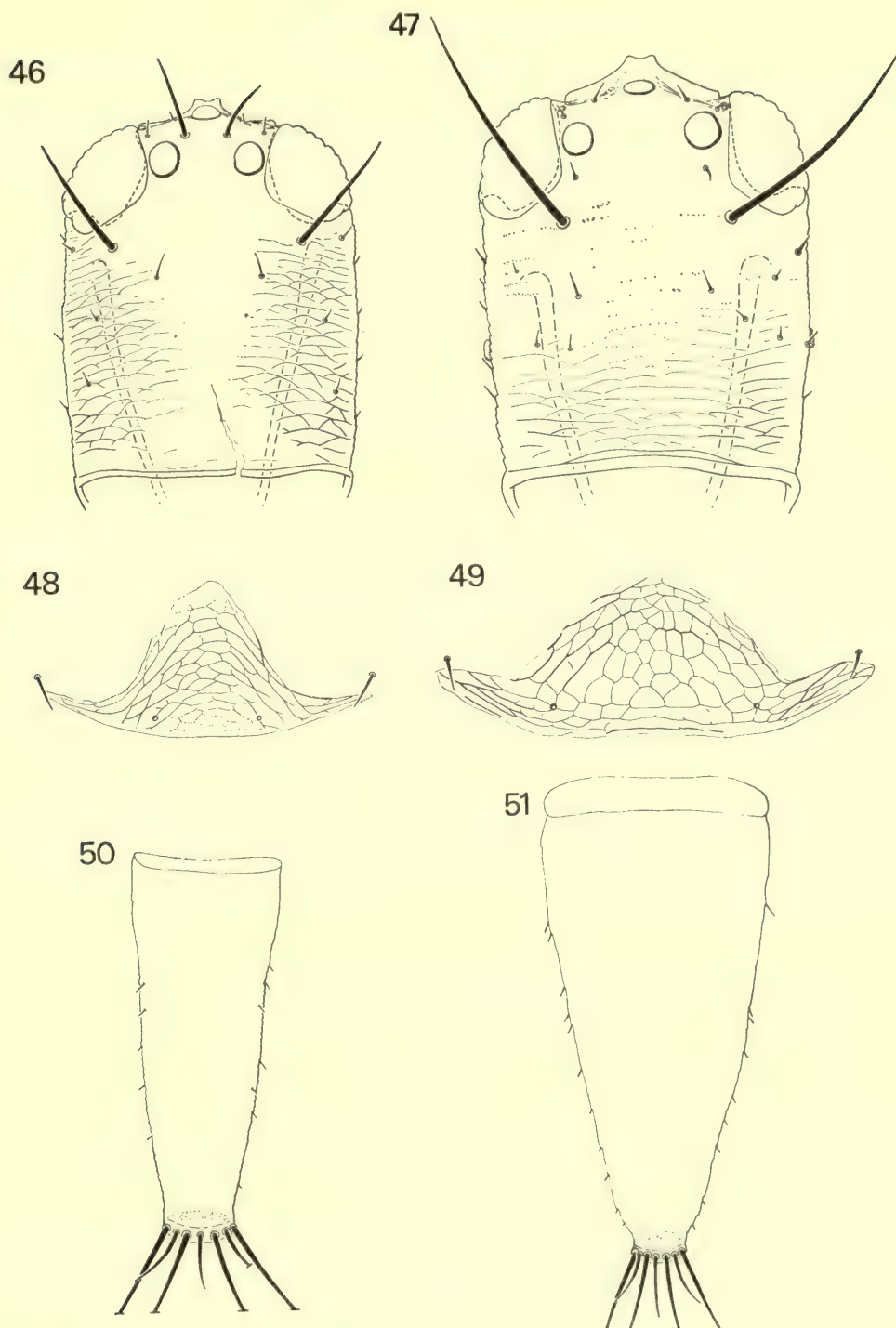
Nesothrips semiflavus (Moulton)

Bolothrips semiflavus Moulton, 1939 : 147-148. Holotype ♀, RAPA Is. (BPBM) [examined].

This species is known only from the unique holotype. It appears to be similar to *artocarp*i in having the head slightly longer than wide, but there are two pairs of long setae behind the eyes, the postoculars 110 μm and the mid-dorsals 70 μm long. The postocellar setae are also 70 μm long. The median setae on tergite nine are 155 μm and the tube 175 μm long. The major setae appear to be paler and more slender than in other species of *Nesothrips*.

SPECIMEN STUDIED.

Holotype ♀, RAPA ISLAND: Mt Tevaitahu at 700 ft, 8.vii.1935 (BPBM).



FIGS 46-51. 46, *Nesidiothrips alius*. 47, *Phacothrips ocelloides*. 48, *N. alius*, pelta. 49, *P. ocelloides*, pelta. 50, *N. alius*, tube. 51, *P. ocelloides*, tube.

***Nesothrips yanchepi* Mound**

Nesothrips yanchepi Mound, 1974 : 75. Holotype ♀, AUSTRALIA: Western Australia (ANIC) [examined].

This species is similar to *niger* (Moulton & Steinweden) but has the eyes less prolonged ventrally and the setae on tergite nine shorter. It is also closely related to *carveri*.

SPECIMENS STUDIED.

Holotype ♀ with 1 ♀, 1 ♂ paratypes, AUSTRALIA: Western Australia, Yanchep near Perth, from sedges at lakeside, 29.ix.1967 (*L. A. Mound*) (ANIC, BMNH).

***PHACOTHRIPS* gen. n.**

Type-species: *Gastrothrips ocelloides* Hood.

Medium sized, dark brown species of Idolothripinae, Cryptothripini. Head as in *Gastrothrips*, not projecting at anterior, eyes large, stylets wide apart, but with one large isolated ommatidium on each cheek midway between posterior margin of head and posterior margin of eye. Antennae with two sense cones on segment III, four sense cones on segment IV; segment VIII more than 0.6 times as long as VII but barely constricted at base. Fore tarsal tooth well developed in both sexes. Median metanotal setae small. Tube very stout, sides strongly convex, maximum width more than 0.5 times the total length, and about 5.0 times the minimum width, terminal setae very weak. Macropterous ♀ with no duplicated cilia; pelta triangular with slender lateral wings. Micropterous ♂ sometimes oedymorous with enlarged pronotum, pelta broadly triangular, metanotum and tergites with supernumerary setae.

This genus is possibly related to the *nigrisetis*-group of species from South America which is treated here under *Neosmerinthothrips*. It is distinguished from other Thysanoptera by the ommatidia on the cheeks and the heavy tube which resembles that of some *Pygothrips* species.

***Phacothrips ocelloides* (Hood) comb. n.**

(Text-figs 47, 49, 51, 68)

Gastrothrips ocelloides Hood, 1950 : 9-12. Holotype ♀, BRAZIL (USNM) [not examined].

This species is here removed from *Gastrothrips* on account of the four sense cones on the fourth antennal segment, as well as the structure of the head and tube.

SPECIMENS STUDIED.

BRAZIL: Distrito Federal, Jacarepagua, 1 ♀, 1 ♂ paratype on dead branches, 14.v.1948 (*J. D. Hood*); São Paulo, Itanhaen, 1 ♀ paratype (sic) on dead branches, 17.vi.1948 (*J. D. Hood & J. Lane*) (AMG); Vicosia, on dead branches, 2 ♀, 1 ♂, vii. 1964, 5 ♀, 1 ♂, xi. 1964 (*F. Andre*) (BMNH).

RHAEBOTHRIPS Karny

Rhaebothrips Karny, 1913 : 128. Type-species: *R. lativentris* Karny, by monotypy.

A revision and diagnosis of this genus was published recently by Sakimura (1971). However, considerably more material is now available and *Rhaebothrips* is used here in a broader sense. Two species are described below which have a small fore tarsal tooth in the female and one of these, *leverii*, is unusually small with a short tube, similar to some *Nesothrips* species. The other species, *doulli*, is interesting because it is closely related to two further new species from New Zealand which do not have a fore tarsal tooth. One of these species is unique in the genus in having the eyes prolonged on the ventral surface of the head as in some *Nesothrips* species. The distinction between these two genera is tenuous and likely to become more so with further collecting in the Pacific area. *Rhaebothrips* species always have a stout pair of setae relatively close together between the posterior ocelli. They are usually larger than *Nesothrips* species with relatively longer antennae and tube.

KEY TO THE SPECIES OF *RHAEBOTHRIPS*

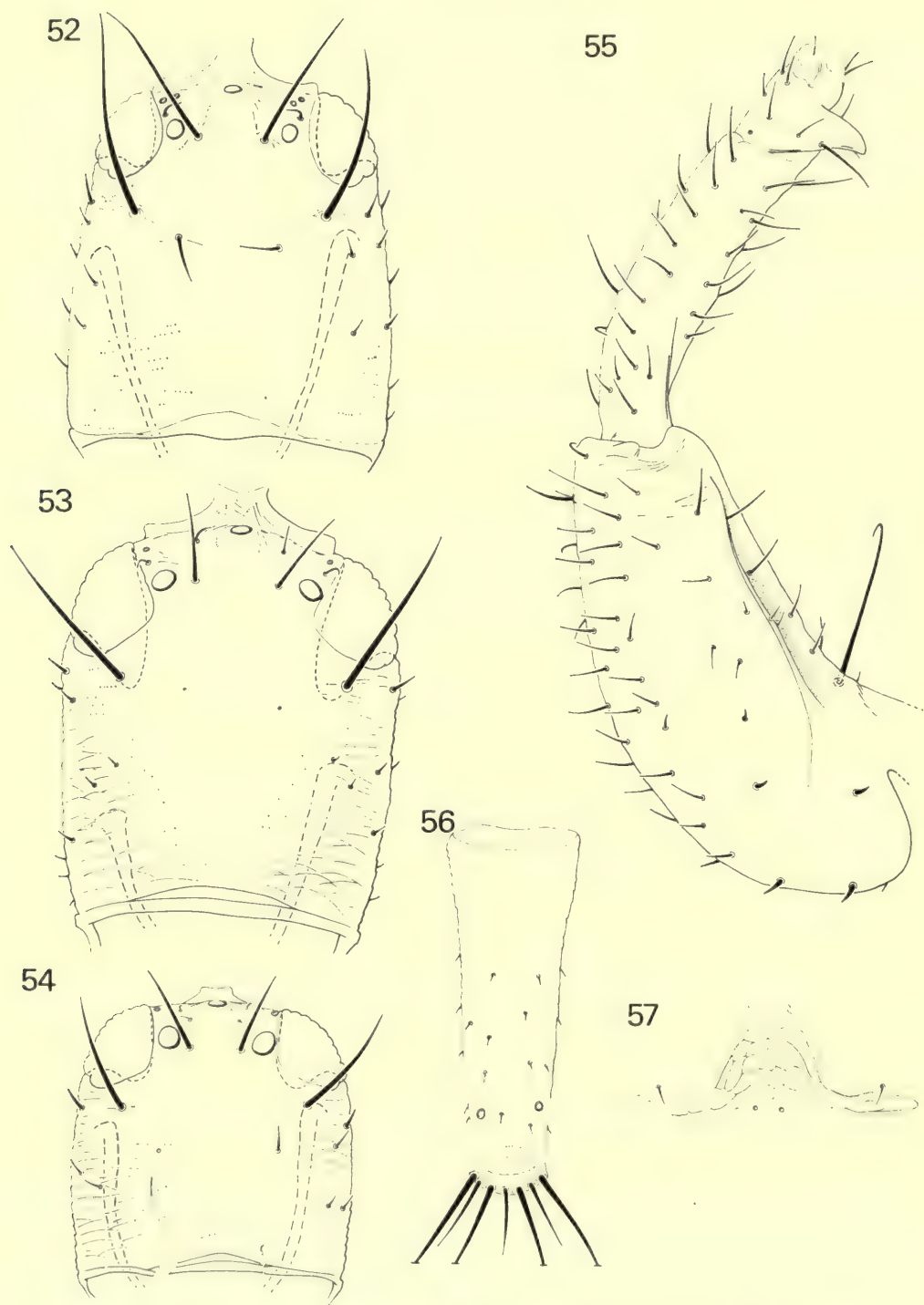
- 1 Antennal segment III largely yellow or yellowish brown; V paler at base 2
- Antennal segment III brown with pedicel pale; V uniformly dark brown 4
- 2 Fore tarsal tooth present in ♀; antennal segment III less than 2.0 times as long as wide (Text-fig. 74) [Fiji] ***leverii*** (p. 175)
- Fore tarsal tooth absent in ♀; antennal segment III more than 3.5 times as long as wide 3
- 3 Lateral setae in abdominal segments III–VIII light brown to yellowish ***lativentris*** (p. 174)
- Lateral setae on abdominal segments III–VIII dark brown to black ***nigrisetis*** (p. 175)
- 4 Setae *B*₁ on tergite IX more than 0.8 times as long as tube, sometimes longer than tube [Pacific Is.] ***major*** (p. 175)
- Setae *B*₁ on tergite IX less than 0.6 times as long as tube [New Zealand] 5
- 5 Head 0.9–1.0 times as long as tube (Text-fig. 58); antennal segment III 2.1–2.2 times as long as wide (Text-fig. 72) ***zondagi*** (p. 176)
- Head 1.2 times as long as tube, antennal segment III 2.4–2.5 times as long as wide (Text-figs 67, 71) 6
- 6 Fore tarsal tooth present in ♀ (only micropterae and hemimacropterae known); eyes not prolonged on ventral surface of head (Text-fig. 52) ***doulli*** (p. 171)
- Fore tarsal tooth not present in ♀ (only macropterae known); eyes 1.4 times as long on ventral surface of head as on dorsal surface (Text-fig. 53) ***eastopi*** (p. 173)

***Rhaebothrips doulli* sp. n.**

(Text-figs 52, 55, 67)

♀ microptera. Colour dark brown with red internal pigment; tarsi and fore tibiae a little paler; antennae dark brown except for yellow pedicel of segment III; fore wing rudiment pale; major setae not very dark, with finely acute apices.

Head longer than wide, cheeks rounded, eyes rather small; ocellar setae arising between posterior ocelli, median setae on vertex sometimes elongate; maxillary stylets retracted to postocular setae; antennae similar in structure to *eastopi*. Pronotum with median thickening



FIGS 52-57. *Rhaeobothrips* species: 52, *R. doulli*, male. 53, *R. eastopi*. 54, *R. leveri*. 55, *R. doulli*, fore leg of male. 56, *R. eastopi*, tube. 57, *R. leveri*, pelta.

developed, epimeral sutures complete; metanotum not sculptured, median setae $50\ \mu\text{m}$ long and $120\ \mu\text{m}$ apart. Fore femur simple, fore tarsus with a small pointed tooth at apex of inner margin about one-third as long as tarsal width. Fore wing lobes with a few cilia. Pelta broad with small lateral wings; tube with straight sides but slightly constricted near apex.

MEASUREMENTS (holotype ♀ in μm). Body length 2900. Head length 310; median width 260, ocellar setae 100 long, bases 55 apart; post ocular setae 145; mid dorsal setae 85 (35 in ♀ paratype). Pronotum, length 175; median width 370; major setae—am 50, aa 50, ml 80–85, epim 120, pa 100–120. Fore wing, length 450; subbasal seta 140. Tergite IV setae, B_1 175, B_2 100. Tergite VII setae, B_1 240; B_2 280. Tergite IX setae, B_1 145, B_2 150, B_3 240. Tube, length 260; basal and apical width, 100, 58; terminal setae 195. Antennal segments length, 50, 70, 105; 100; 85; 77; 55; 40.

♂ microptera. Colour similar to ♀ (2 ♂ paratypes teneral). Pronotum strongly thickened medially and along anterior border; fore femur enlarged L-shaped; fore tarsal tooth curved, almost as long as tarsal width; major setae of head and pronotum longer than in ♀.

MEASUREMENTS (paratype ♂ in μm). Body length 2400. Head length 290; ocellar setae 100; postocular setae 160, mid-dorsal seta 50. Pronotum, length 225; median width 350; major setae—am 50, aa 65, ml 145, epim 160, pa 145. Fore wing, length 400; subbasal setae 145, 230. Tube length 225.

SPECIMENS STUDIED.

Holotype ♀, NEW ZEALAND: Christchurch, on dead walnut twig, 1951 (*K. M. Doull*) (BMNH).

Paratypes. NEW ZEALAND: 1 ♀, 4 ♂ collected with holotype (BMNH) (1 ♂ deposited in DSIR); 1 ♀, 1 ♂ on *Cytisus* bark, Cave [100 miles south-west of Christchurch], 9.vii.1969 (*R. Zondag*) (NZFI).

COMMENTS. This species is closely related to *eastopi* described below which unfortunately is known only from a different morph. The third antennal segment of these two species differs from *lativentris* and *major* in being slightly swollen in the basal third. The female paratype from Cave has fore wings $950\ \mu\text{m}$ long and a rather stouter fore tarsal tooth than the micropterae, but the male with which it was collected cannot be distinguished from the other male paratypes.

Rhaebothrips eastopi sp. n.

(Text-figs 53, 56, 71)

♀ macroptera. Colour dark brown, fore tarsi yellowish, fore tibiae light brown; antennae brown to dark brown, III slightly lighter with pedical yellow; fore wings very weakly shaded; major setae light brown and finely acute.

Head longer than wide; ocellar setae arising between posterior ocelli, maxillary stylets not retracted to postocular setae, eyes prolonged and narrowed on ventral surface; antennal segment III slightly swollen in basal third, VII with a distinct pedicel, two sense cones on III, four on IV. Pronotum smooth, median thickening not developed, epimeral sutures complete; metanotum weakly reticulate medially, setae $65\ \mu\text{m}$ long. Fore tarsus angulate on inner surface but without a tooth; fore wing narrow (?partially reduced). Pelta with lateral wings extending almost to lateral margins of tergite II; tube with almost straight margins.

MEASUREMENTS (holotype ♀ in μm). Body length 2800. Head length 320; median width 255; ocellar setae 65 long, bases 62 apart; postocular setae 135. Pronotum, length 195; median width 310; major setae—am 35, aa 25, ml 50, epim 100–110; pa 95–100. Fore wing, length 950; distal width 80; subbasal setae 50, 50; number of duplicated cilia 3–4. Tergite

IV setae, B_1 145; B_2 80. Tergite VII setae, B_1 245; B_2 225. Tergite IX setae, B_1 145; B_2 130; B_3 225. Tube, length 260; basal and apical width 100, 52; terminal setae 195. Antennal segments length, 50, 65, 100, 115, 100, 70, 56, 45.

SPECIMEN STUDIED.

Holotype ♀, NEW ZEALAND: South Island, 15 miles S.E. of Greymouth, Moana Kotula, from *Uncinia* and *Juncus*, 12.ix.1972 (V. F. Eastop) (BMNH).

COMMENTS. The unique holotype is possibly not fully macropterous. The antennae, particularly segment three, are similar to *doulli* described above, but that species has a distinct fore tarsal tooth in the female and the eyes are not prolonged ventrally.

Rhaebothrips lativentris Karny

Rhaebothrips lativentris Karny, 1913 : 129-130. Holotype ♂, TAIWAN (? lost) [not examined].

Cryptothrips claripennis Hood, 1919 : 90. Holotype ♀, AUSTRALIA: Queensland (USNM) [examined]. [Synonymized by Mound, 1974 : 91.]

Cryptothrips seychellensis Bagnall, 1921 : 274-276. Lectotype ♂, SEYCHELLES (BMNH) [examined]. **Syn. n.**

Cryptothrips difficilis Bagnall, 1921 : 276. Holotype ♀, SEYCHELLES (BMNH) [examined]. **Syn. n.**

Machatothrips ipomoeae Ishida, 1932 : 12-14. Holotype ♀, PONAPE (Hokkaido Univ.) [not examined]. [Synonymized by Kurosawa, 1968 : 60.]

Cryptothrips magnus Moulton, 1928a : 299. Holotype ♀, TAIWAN (CAS) [not examined]. [Synonymized by Sakimura, 1972 : 668.]

Gynaikothrips yuasai Moulton, 1928b : 315. Holotype ♀, TAIWAN (CAS) [not examined]. [Synonymized by Sakimura, 1972 : 668.]

Rhaebothrips fuscus Moulton, 1942 : 15-16. Holotype ♀, GUAM (BPBM) [not examined]. [Synonymized by Sakimura, 1971 : 393.]

Bolothrips australiensis Moulton, 1968 : 118-119. Holotype ♀, LORD HOWE ISLAND (CAS) [examined]. [Synonymized by Mound, 1974 : 91.]

This remarkable synonymy is a reflection partly of the variation in structure of *lativentris*, but more particularly of the low standard of preparation of most of the microscope slides on which these nominal species were based. Sakimura (1971) has given an account of the variation of the species, and moreover distinguished a new species, *nigrisetis* from Fiji and New Guinea. However, in the opinion of the present author, *lativentris* is native to – and has its centre of diversity in – the western Pacific. Individuals with black setae which correspond to the description of *nigrisetis* have been studied from the Solomon Islands and the New Hebrides, and also from Fiji where they were collected together with normal *lativentris*. It seems unlikely that two species are involved in this pattern of variation although the names are retained separate for the present.

There are specimens of *lativentris* in the BMNH collection from Samoa, Hawaii, Guam, Solomon Islands, New Guinea, Queensland, Malaya, Seychelles, Jamaica, Cayman Islands and Trinidad. Sakimura (1971 ; 1972) also lists southern Japan, Taiwan, Philippines, Java, Mauritius, Puerto Rico, Cuba, Dominican Republic, Panama, Bahama and Florida.

***Rhaebothrips leveri* sp. n.**

(Text-figs 54, 57, 74)

♀ macroptera. Colour dark brown, tarsi yellow, fore tibiae with yellow markings; antennal segments I and VI–VIII brown, II yellow at apex, III and IV yellow but light brown distally, V brown with a yellow pedicel; fore wing shaded; major setae dark brown.

Head longer than wide; ocellar setae arising on line joining posterior margins of posterior ocelli; postocular setae acute; maxillary stylets retracted to postocular setae; antennal segments VI–VIII compact, two sense cones on III, four on IV. Pronotum transverse, median thickening slender; epimeral sutures just complete; epimeral setae bluntly acute. Metanotum not sculptured medially, setae 30 μ m. Fore tarsal tooth acute but less than half as long as tarsal width. Pelta with slender lateral wings; tergal lateral setae not long, blunt at apex; sides of tube straight.

MEASUREMENTS (holotype ♀ in μ m). Body length 1850. Head length 220; width 210; postocellar setae 60; postocular setae 90. Pronotum, length 105; median width 260; major setae – am 35, aa 35, ml 58, epim 80–85, pa 50–60. Fore wing, length 750; distal width 65; subbasal setae 40, 58, 58; number of duplicated cilia 5–6. Tergite IV setae B_1 80; B_2 65. Tergite VII setae, B_1 135; B_2 100. Tergite IX setae, B_1 115; B_2 125, B_3 135. Tube, length 145; width at base 80, at apex 42; terminal setae 135. Antennal segments length, 26, 50, 60; 50; 42; 45; 35; 20.

SPECIMEN STUDIED.

Holotype ♀, FIJI: Viti Levu, Vatuwaga, 12.vii.1941 (*R. A. Lever*) (BMNH).

COMMENTS. This species could equally well be placed in *Nesothrips*. It is here described in *Rhaebothrips* partly because it is more closely related to *lativentris* than to *N. oahuensis*, and partly because the only other related species with a fore tarsal tooth is *R. doulli* from New Zealand.

***Rhaebothrips major* Bagnall**

Rhaebothrips major Bagnall 1928 : 75–76. ?Holotype ♂, SAMOA (?lost) [not examined].

The (?unique) holotype male, not female as stated in the original description, should be in Bagnall's collection at the BMNH but cannot be found (Mound, 1968). Sakimura (1972) has given a redescription of *major* from specimens collected in Samoa, and there is one macropterous male in the BMNH collections from the Solomon Islands apparently of this species.

***Rhaebothrips nigrisetis* Sakimura**

Rhaebothrips nigrisetis Sakimura, 1972 : 400–402. Holotype ♂, FIJI (BPBM) [not examined.]

Sakimura described this species from nearly eighty specimens collected in Fiji and one male from New Guinea. As mentioned above there are specimens apparently of *nigrisetis* in the BMNH collection from New Hebrides, the Solomon Islands and New Guinea, as well as some from Fiji which were collected with *lativentris*, and it is doubtful if these two species are really distinct. The *Rhaebothrips* specimens from New Guinea are particularly difficult. Specimens in one series in the

BMNH collected on various dates at Bulolo in S.E. New Guinea are similar to *nigrisetis* but with the antennae darker. Another series in the BPBM from N.W. New Guinea (Irian Barat) near Nabire and Lake Wissel have black setae but are much larger than any other *Rhaebothrips* which have been studied.

***Rhaebothrips zondagi* sp. n.**

(Text-figs 58, 72)

♀ macroptera. Colour brown, head and tube darkest; fore tarsi little paler than femora; antennae dark brown, pedicel of segment III yellow; fore wing uniformly shaded dark brown; major setae brown but not very dark, with finely acute apices.



FIG. 58. *Rhaebothrips zondagi*, male.

Head longer than wide, ocellar setae between posterior ocelli; maxillary stylets not retracted to postocular setae; antennae relatively short but similar to those of *eastopi*. Pronotum with weak median thickening; epimeral sutures complete; median area of metanotum not sculptured, setae 50–60 μm long and 50 μm apart. Fore femur simple, fore tarsus with no tooth; fore wing relatively broad. Lateral wings of pelta not extending fully across anterior margin of tergite II; sigmoid setae well developed on II–VII; tube with straight sides.

MEASUREMENTS (holotype ♀ in μm). Body length 2450. Head, length 260; median width 225; ocellar setae 70, bases 35 apart; postocular setae 100. Pronotum, length 160; median width 275; major setae – am 35, aa 20, md 50, epim 90, pa 100. Fore wing, length 1100; distal width 115; subbasal setae 65, 100, 115, number of duplicated cilia 12. Tergite IV setae, B_1 125, B_2 80. Tergite VII setae, B_1 220, B_2 195. Tergite IX setae, B_1 120; B_2 145; B_3 195. Tube, length 275; basal and apical width 95, 50; terminal setae 160. Antennal segments length, 40, 65, 90, 80, 70, 65, 50, 35.

♂ macroptera. Colour and structure similar to ♀; frequently oedymorous with fore femora enlarged and L-shaped, and fore tarsus with a stout tooth equal in length to tarsal width; major setae of head and pronotum longer than in ♀; fore wing relatively small.

MEASUREMENTS (paratype ♂ in μm). Body length 2300. Head, length 260; median width 210; ocellar setae 90; post ocular setae 135; mid dorsal setae 50–65. Pronotum, length 195; median width 320; major setae – am 55, aa 30, ml 115, epim 100, pa 135. Fore wing, length 900; distal width 85; number of duplicated cilia 8; sub-basal setae 115, 160. Tergite IX setae, B_1 100; B_2 95; B_3 225. Tube length 255.

SPECIMENS STUDIED.

Holotype ♀, NEW ZEALAND: South Island, Hochstetter State Forest 25 miles east of Greymouth, on *Phyllocladus alpinus* branches, 13.iii.1970 (*W. A. Holloway*) (DSIR).

Paratypes. NEW ZEALAND: 13 ♀, 8 ♂ collected with the holotype; 2 ♀ North Island, Mangawiri Basin, Whiriaki (Urewera), 40 miles south-west of Rotorua, on *Podocarpus totara* twigs, 13.iv.1972 (*P. J. Alma*) (DSIR, NZFI, BMNH).

COMMENTS. This species is related to the other two species described above from New Zealand in having short setae on tergite nine. The antennae are shorter than any other species of *Rhaebothrips*, apart from the aberrant *leverii* from Fiji, but the tube is longer than any species of *Nesothrips* with which it might be confused.

SCOTOTHIRIPS Priesner

Scotothrips Priesner, 1939 : 75. Type-species: *Adiaphorothrips elephas* Karny, by original designation.

The synonymy of this genus and its relationships to *Dichaetothrips* have been discussed recently by Mound (1974). *Scotothrips* species are found mainly in the Pacific, Indonesian and Australian regions, and the Brazilian species *firmus* listed below is not typical of the group.

Scotothrips claripennis (Moulton) comb. n.

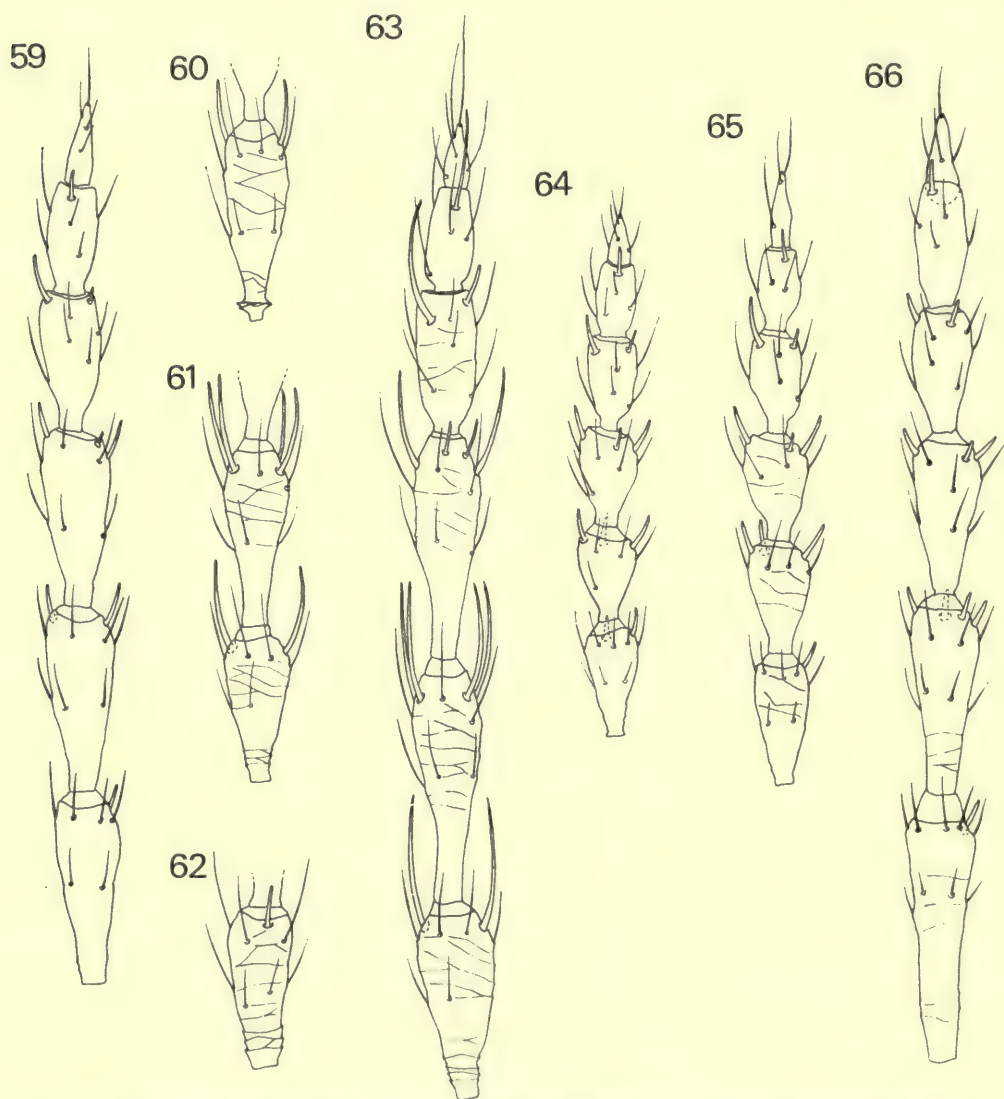
Dichaetothrips claripennis Moulton, 1934 : 503. Holotype ♀, HAWAII (CAS) [not examined].

Gastrothrips trinidadensis Hood, 1935 : 168–170. Holotype ♀, TRINIDAD (USNM) [not examined]. **Syn. n.**

Nesothrips indicus Ananthakrishnan, 1968 : 967-969. Syntypes ♂ ♀, INDIA: Madras (TNA) [not examined]. **Syn. n.**

Nesothrips diversus Ananthakrishnan, 1972 : 434-436. Holotype ♀, INDIA: Madras (TNA) [not examined]. **Syn. n.**

This species was based on a single female collected in Honolulu. This specimen has not been studied, but the above synonymy is based on a female from Honolulu determined as *claripennis* by Bianchi. This species does not belong in *Nesothrips*



FIGS 59-66. Right antennae (III-VIII unless stated otherwise): 59, *Bolothrips italicus*. 60, *Carientothrips acti*, III. 61, *C. fijiensis*, III-IV. 62, *C. japonicus*, III lateral. 63, *C. grayi*. 64, *Gastrothrips falcatus*. 65, *G. ruficauda*. 66, *Diceratothrips validipennis*.

because of the presence of a fore tarsal tooth in the female, nor in *Gastrothrips* because of the four sense cones on the fourth antennal segment. The elongate straight-sided tube is typical of the *Scotothrips*/*Dichaetothrips* complex, and because the postocellar setae are short *claripennis* is here placed in *Scotothrips*.

The vertex of this species is narrowed in dorsal view but is very deep. This shape is very susceptible to distortion in mounting, and the *claripennis* and *indicus* specimens which have been studied have the head apparently rather broad at the base. The specimens described as *diversus* are here regarded as small pale forms of the larger species. The most constant characteristic in all this material is the presence of a pair of pores on the metanotum anterolateral to the metanotal setae. The colour of antennal segments three and four is variable, although three is usually yellow with a shaded apex and four is usually light brown. The mid and hind tarsi are usually yellow but sometimes light brown. In the BMNH collections there are several specimens of *Dichaetothrips usitatus* Ananthakrishnan & Jagadish, 1970 (*Dichaetothrips indicus* Ananthakrishnan, 1961) which had been misidentified as *Nesothrips indicus* Ananthakrishnan, 1968 despite the presence of very long postocellar setae. One of the male paratypes of *diversus* is also a misidentification of *usitatus*. The species *claripennis* has probably been transported around the tropics by man.

SPECIMENS STUDIED.

HAWAIIAN ISLANDS: Oahu, Honolulu, Mckinkey High, 1 ♀ in Monkey Pod, iv. 1946 (*F. A. Bianchi*) (BMNH).

MEXICO: 3 ♀, 2 ♂ on *Cocos nucifera* seed, in quarantine at US (USNM). BAHAMAS: 1 ♀ on *Cocos nucifera* seed, 1 ♀ on *Poinciana regia* pod, in U.S. quarantine (USNM). JAMAICA: Caenwood, 1 ♀, vi. 1970 (*K. Heinze*) (BMNH); 1 ♀, 2 ♂ on *Cocos nucifera* fls, 1 ♀ on *Delonix regia* pod, in U.S. quarantine (USNM); TRINIDAD: St Clair, 1 ♀ paratype of *trinidadensis* in hole in dead bamboo, 13.i.1917 (*C. B. Williams*) (AMG).

MOZAMBIQUE: Lourenço Marques, 1 ♀ in *Cassia* pods, vii. 1936 (*J. C. Faure*) (AMG); SOUTH AFRICA: Natal, Winterskloof, 2 ♀, 1 ♂ in *Cassia* pods, vii. 1942 (*F. Casalis*) (AMG).

INDIA: Madras, 1 ♀, 2 ♂, determined as *indicus*, ii. 1966, 1 ♀ paratype of *diversus*, xii. 1970 (*T. N. Ananthakrishnan*) (BMNH).

Scotothrips firmus (Hood) comb. n.

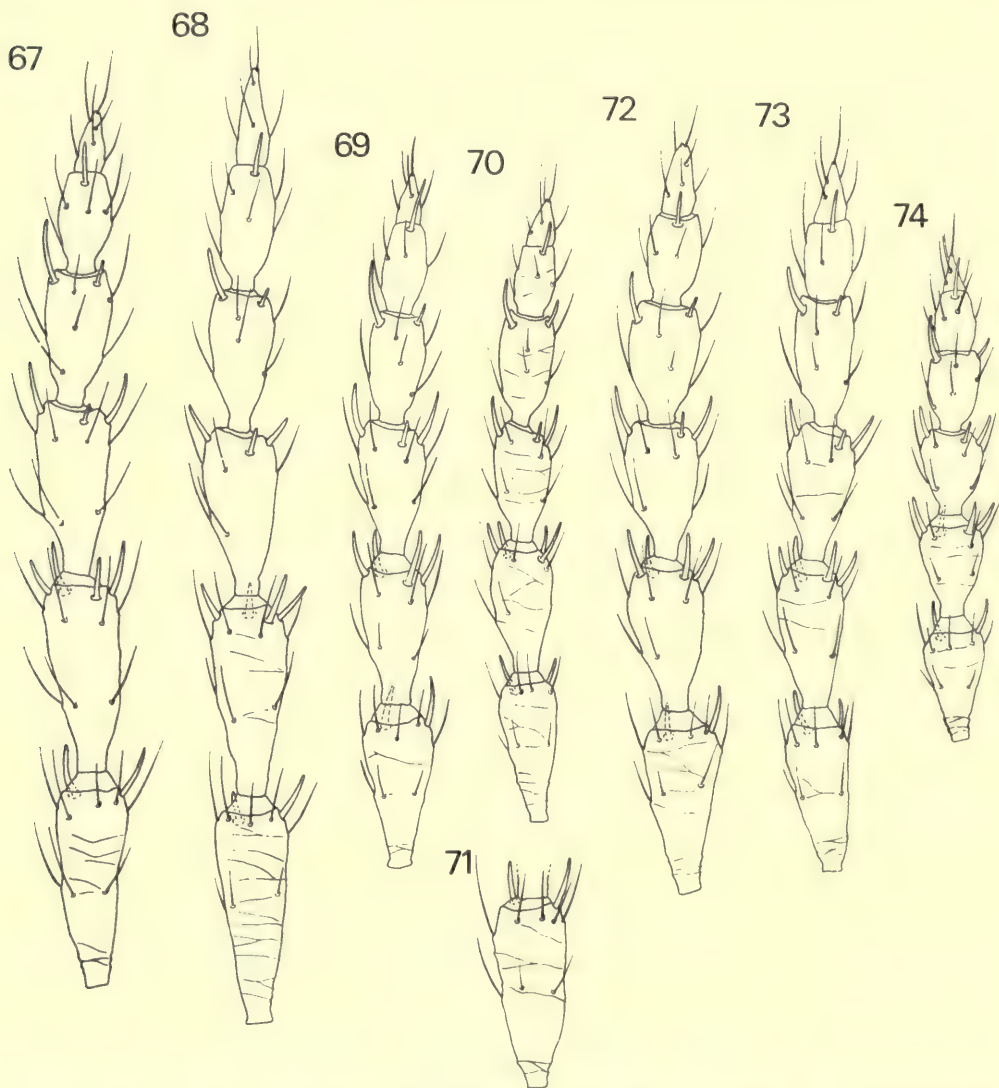
Gastrothrips firmus Hood, 1952 : 162. LECTOTYPE ♀, BRAZIL (USNM), here designated [not examined].

The head of this species is unusual in *Scotothrips* as the cheeks are constricted near, but not at, the base, and the eyes are slightly swollen at their posterior margin. The fore tarsus bears a small tooth in the female, the pronotum is thickened medially and at the anterior margin, the median metanotal setae are small and slender, the pelta broadly triangular with the median pores close together, and the tube is long with straight sides. The specimen here designated as lectotype has not been studied

but is that specimen which was labelled holotype by Hood but not referred to in his text. The lectotype bears identical data to the paratype listed below and has been given the following number: USNM Type Number 71995.

SPECIMEN STUDIED.

BRAZIL: São Paulo, Itanhaen, 1 ♀ paratype on dead branches, 17.vi.1948 (J. D. Hood & J. Lane) (AMG).



FIGS 67-74. Right antennae (III-VIII unless stated otherwise): 67, *Rhaebothrips doulli*. 68, *Phacothrips ocelloides*. 69, *Nesidiothrips alius*. 70, *Neosmerinthothrips fructuum*. 71, *Rhaebothrips eastopi*, III. 72, *R. zondagi*. 73, *Neosmerinthothrips variipes*. 74, *Rhaebothrips leverii*.

SYNCEROTHRIPS Hood gen. rev.

Syncerothrips Hood, 1935 : 191–192. Type-species: *S. harti* Hood, by monotypy.

Stannard (1957) synonymised this genus with *Nesothrips* on the grounds that the last two antennal segments of the type-species of *Neosmerinthothrips* were more or less closely joined. However, *Syncerothrips* is closely related to the South American species of *Gastrothrips*. There are three sense cones on the fourth antennal segment and two on the third, the median metanotal setae are very stout, and the pelta triangular. The only species in the genus differs from *Gastrothrips* species in having the last two antennal segments fused with only a partial suture on the ventral surface. The fore tarsus does not bear a tooth in the female, and the postocellar setae are long.

***Syncerothrips harti* Hood**

Syncerothrips harti Hood, 1935 : 192–194. Holotype ♀, U.S.A.: Texas (USNM) [not examined].

This species was based on a single female, but the specimen listed below was taken at the type-locality and identified by Hood.

SPECIMEN STUDIED.

U.S.A.: Texas, Brownsville, 1 ♀ microptera on dead branches, 2.iii.1939 (*J. D. Hood*) (USNM).

SPECIES REMOVED FROM THE NESOTHRIPS COMPLEX

The following three species were described in genera related to *Nesothrips*, but they are not even members of the subfamily Idolothripinae in its strict sense. Species of the genus *Adelothrips* have moderately broad maxillary stylets and probably feed on fungus spores, but in view of the structure of the male abdomen it is likely that this genus is derived from *Hoplothrips*-like members of the Phlaeothripinae (Mound, 1974).

***Adelothrips lativerticis* (Post) comb. n.**

Bolothrips lativerticis Post, 1961 : 140–143. Holotype ♀, U.S.A.: Oregon (CAS) [examined].

The original illustration of this species shows five sense cones on the third antennal segment and six on the fourth, although the description gives the actual number correctly as three and four. There are two pairs of wing retaining setae on each tergite, unlike any member of the Cryptothripini discussed in this paper. Moreover the males of *lativerticis*, like other members of *Adelothrips*, have setae B_2 on tergite nine short and stout, and sternites six and seven have glandular areas. This species is a typical member of *Adelothrips* because of the number of antennal sensoria, the fusion of the last two antennal segments, the position of the maxillary stylets close together in the middle of the head, the bell-shaped pelta, and the abdominal structure detailed above.

SPECIMENS STUDIED.

Holotype ♀, U.S.A.: Oregon, Hood River County, Herman Creek, in hollow twigs, 31.i.1946 (R. L. Post) (CAS).

U.S.A.: Oregon, Benton County, Corvallis, paratype ♀, 23.iii.1946 (Leah & Post) (R. L. Post coll. North Dakota); Washington, Puyallup, 3 ♀, 2 ♂ in dead willow, 20.iv.1937 (B. Baker) (BMNH).

Adelothrips speciosissimus (Karny)

Nesothrips speciosissimus Karny, 1920 : 42. Holotype ♂, AUSTRALIA: Queensland (NR) [examined].

Adelothrips speciosissimus (Karny) Mound, 1974 : 16.

This species may not be native to Australia as the most closely related species appears to be *skwarrae* Priesner from Mexico. The male has setae B_2 on tergite nine short, and sternites six and seven have reticulate glandular areas.

SPECIMENS STUDIED.

Holotype ♂, AUSTRALIA: Queensland, Cedar Creek, March (Mjoberg) (NR).

AUSTRALIA: Queensland, Clump Point, Mission Beach, 2 ♀ on dead branches, 21.vii.1968 (L. A. Mound 764) (BMNH).

Liothrips debilis (Hood) **comb. n.**

Neosmerinthothrips (?) *debilis* Hood, 1936 : 269-271. Holotype ♂, PANAMA (USNM) [examined].

This species was described from a single male with stout maxillary guides but with slender maxillary stylets. It is a member of the subfamily Phlaeothripinae despite the fact that all three pairs of major setae on tergite nine are elongate, a characteristic shared with several South American species in the genus *Liothrips*. The genus is widespread in the tropics and the species feed on the leaves of green plants.

SPECIMEN STUDIED.

Holotype ♂, PANAMA: Frijoles, on *Panicum maximum*, 23.vii.1933 (P. C. Standley) (USNM).

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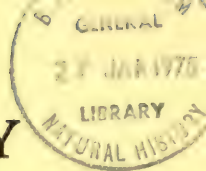
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(ORTHOPTERA : ACRIDOIDEA)

D. HOLLIS

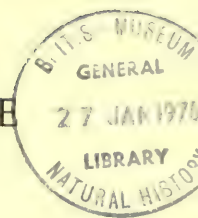
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BY
DAVID HOLLIS
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SYNOPSIS

The Old World Acridid subfamily Oxyinae is reviewed and redefined. A key is given to the 21 genera now included in the subfamily. Each genus is defined and a list is given of its included species. Of the 169 described species in the subfamily, 125 are regarded as valid. 125 primary types, including those of the genus *Oxya*, have been examined and as a result 11 new generic synonyms, two new specific synonyms and 25 new combinations are proposed. One new genus is described; one generic name, one specific name and three combinations are revived.

INTRODUCTION

DURING a recent study on the genus *Oxya* (Hollis, 1971) it became clear that (i) the genus *Oxya* did not represent a monophyletic entity, (ii) the derivations of the various species-groups involved in *Oxya* were obscure, and (iii) the current definition and scope of the subfamily Oxyinae (Dirsh, 1961) needed some form of revision and rearrangement. At that time it was thought practical to publish the results of the study on *Oxya* separately (Hollis, 1971) considering the genus as a convenient entity but pointing out that some of its species-groups should be transferred to other genera and that study was continuing on the whole subfamily. The results of this study are presented below in review form as it was found impractical, both in terms of time and available information, to make a complete systematic revision of the group.

This review is based on a study of the extensive collections of Oxyinae housed in the British Museum (Natural History), London; the Museum für Naturkunde der Humboldt-Universität, Berlin; the Instituto Español de Entomología, Madrid;

and the collection of the late C. Willemse. Type and other material was borrowed from institutions in Basle, Eberswalde, Geneva, Leiden, Oxford, Paris and Stockholm.

Drawings of the parts of the male phallic complex were made after extraction and maceration in 10 per cent. potassium hydroxide solution, and the abbreviations used in these figures are based on those used in Hollis (1971). Drawings of other features were made from dry material.

Type-depositories of species included in the subfamily are given in abbreviated form as follows.

NM, Basle	Naturhistorisches Museum, Basle.
MNHU, Berlin	Museum für Naturkunde der Humboldt-Universität, Berlin.
BMNH	British Museum (Natural History), London.
IRSNB, Brussels	Institut Royal des Sciences Naturelles de Belgique, Brussels.
UZM, Copenhagen	Universitetets Zoologiske Museum, Copenhagen.
DEI, Eberswalde	Deutsches Entomologisches Institute, Eberswalde, D.D.R.
MHN, Geneva	Muséum d'Histoire Naturelle, Geneva.
MCSN, Genoa	Museo Civico di Storia Naturale, Genoa.
RNH, Leiden	Rijksmuseum van Natuurlijke Historie, Leiden.
ZI, Leningrad	Zoological Institute, Academy of Sciences of U.S.S.R., Leningrad.
IEE, Madrid	Instituto Español de Entomología, Madrid.
UM, Oxford	University Museum, Oxford.
MNHN, Paris	Muséum National d'Histoire Naturelle, Paris.
ANS, Philadelphia	Academy of Natural Sciences, Philadelphia.
ZIHU, Sapporo	Zoological Institute, Hokkaido University, Sapporo.
NR, Stockholm	Naturhistoriska Rijksmuseum, Stockholm.
MRAC, Tervuren	Musée Royal de l'Afrique Centrale, Tervuren.
ZIUU, Uppsala	Zoologiska Institutionen, Uppsala.
NM, Vienna	Naturhistorisches Museum, Vienna.
USNM, Washington	U.S. National Museum, Washington.
coll. Willemse	Dr Fer Willemse, Eygelshoven, Laurastraat 67, Netherlands

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This is an opportune moment for me to thank Dr L. L. Mishchenko, of the Academy of Sciences, Leningrad, for his help in lending type-material of the genus *Oxya* and to apologize for not acknowledging his valuable help towards the production of my previous paper (Hollis, 1971).

HISTORICAL

Although first named by Brunner (1893 : 136) as the 'Oxyae', the group was recognised earlier by Stål (1878 : 45) as 'part 1 of Division 12' in his key to Orthopteran genera. I. Bolívar (1918) redefined the group as 'Section Oxyae' of the family Acrididae; Willemse (1921) listed the genera he considered to belong to the group Oxyae of the subfamily Cyrtacanthacrinae occurring in the austro-oriental region; Rehn (1957), in his study of the Australasian Acrididae, gave the

TABLE I

Genera included by various authors in the Oxyinae

Genus	Stål (1878)	Brunner (1893)	Bolívar (1918)	Willemse (1921)	Rehn (1957)	Dirsh (1961)
<i>Quilta</i>	✓	✓	✓	✓		✓
<i>Gesonia</i>						
(now <i>Gesonula</i>)	✓	✓	✓	✓	✓	
<i>Oxya</i>	✓	✓	✓	✓	✓	✓
<i>Caryanda</i>	✓	✓	✓	✓		✓
<i>Digentia</i>	✓	✓	✓			✓
<i>Bermius</i>	✓	✓	✓	✓	✓	
<i>Hieroglyphus</i>	✓	✓	✓	✓		
<i>Tauchira</i>	✓	✓	✓	✓		
<i>Racilia</i>	✓	✓	✓	✓		✓
<i>Badistica</i>		✓	✓			✓
<i>Hieroceryx</i>						
(now <i>Parahieroglyphus</i>)			✓	✓		
<i>Chitaura</i>			✓	✓		✓
<i>Fer</i>			✓	✓		
<i>Genditia</i>			✓			✓
<i>Carydana</i>			✓			
<i>Gerista</i>			✓			✓
<i>Tauchiridea</i>			✓	✓		
<i>Maga</i>			✓	✓		
<i>Cledra</i>						
(now <i>Cercina</i>)			✓			✓
<i>Gerunda</i>			✓	✓		
<i>Pododula</i>			✓			
<i>Theomolpus</i>			✓	✓	✓	
<i>Bermiella</i>			✓	as <i>Macroquilta</i>	✓	
<i>Bermioides</i>			✓	✓	✓	
<i>Racilidea</i>			✓	✓		
<i>Austeniella</i>						✓
<i>Caledonia</i>						
(now <i>Caledonula</i>)						✓
<i>Dapperia</i>					✓	✓
<i>Dibastica</i>			✓			✓
<i>Lucretilis</i>						✓
<i>Pterotiltus</i>						✓
<i>Zulua</i>	as <i>Oxya</i>					✓
<i>Brachycercus</i>				✓		
<i>Tolgadia</i>					✓	

group tribal status. Dirsh (1956 : 253) defined the group Oxyae of the subfamily Catantopinae using, in addition to external characters, some male phallic complex structures, and the same author (Dirsh, 1961 : 400) gave the group its current definition and status as a sub-family.

The earlier authors, viz. Stål, Brunner and Bolívar, all used a similar assemblage of characters to define the group, and these in essence were: fastigium of vertex horizontal or subhorizontal, little produced forward and forming a rounded angle with the frons; frontal ridge sulcate and continuous to clypeus; prosternal process conical or transverse but if latter then narrow at base; mesosternal lobes not contiguous; fore wing without transverse parallel stridulatory veinlets; lower genicular lobe of hind femur usually produced posteriorly into a spine, sometimes angular, rarely rounded; hind tibia with small spines, outer apical spine almost always present; male subgenital plate conical, produced, with rounded or subacute apex. Willemse and Rehn added nothing significant to this definition. Dirsh (1961) used basically this definition adding to it the form of the male epiphallus, i.e. bridge-shaped with divided or partially divided bridge, with ancorae and lophi; and the flexured form of the penis valves in the phallic complex. The genera included in these various authors' groups are given in Table 1. It is noticeable from this table that Dirsh included far fewer genera in the group than did Bolívar, principally due to the placing of *Bermius*, *Gesonula*, *Hieroglyphus*, *Parahieroglyphus* and *Tauchira* into his subfamily Hemiacridinae, and others presumably into the subfamily Catantopinae.

EVALUATION OF PRESENT CLASSIFICATION AND CHARACTERS USED

In his revision of the higher groups of Acridoidea Dirsh (1961 : 358) states that he regards a subfamily 'as a group of genera with one or more convenient characters or a combination of characters, which do not normally occur in other groups of genera of the family, but are not exclusive . . .', and on this basis divides the family Acrididae into 17 subfamilies including the Hemiacridinae, Oxyinae and Catantopinae. It is clear from his key (Dirsh, 1961 : 389) that the Hemiacridinae are separated from the Oxyinae on the basis of the former having transverse parallel stridulatory veinlets on the tegmen and divided penis valves, and the latter having no such stridulatory mechanism, flexured penis valves and the lower genicular lobe of the hind femur spine-like posteriorly. The Catantopinae are defined by a series of negatives as a dumping ground for all those genera which cannot be placed into any of the other 16 subfamilies.

In studying the Oxyinae it is obvious that the limits of the group become very vague and merge with some genera in the Hemiacridinae. This latter group is probably polyphyletic and badly needs reviewing. Dirsh's classification of the Acrididae on an arbitrary basis of convenient characters, although representing some progress and providing at least a library classification of the group, has no strong phylogenetic basis, and in terms of predictive value, is often misleading. Having an existing classification of the acridids one is either forced to fit genera into its framework or to make a complete revision of the whole family; one cannot,

piecemeal upgrade or downgrade individual groups within the classification. I regard the erection and definition of acridid subfamilies as highly ambitious given the present state of our knowledge of the group. All one can say about the Acrididae at present is that, apart from a few groups including Coptacridinae, Calliptaminae, Euryphyminae, the Cyrtacanthacridinae and the Acridinae-Truxalinae complex, it is a large assemblage of genera in which certain groupings are recognizable but the affinities of a large proportion of the genera are obscure.

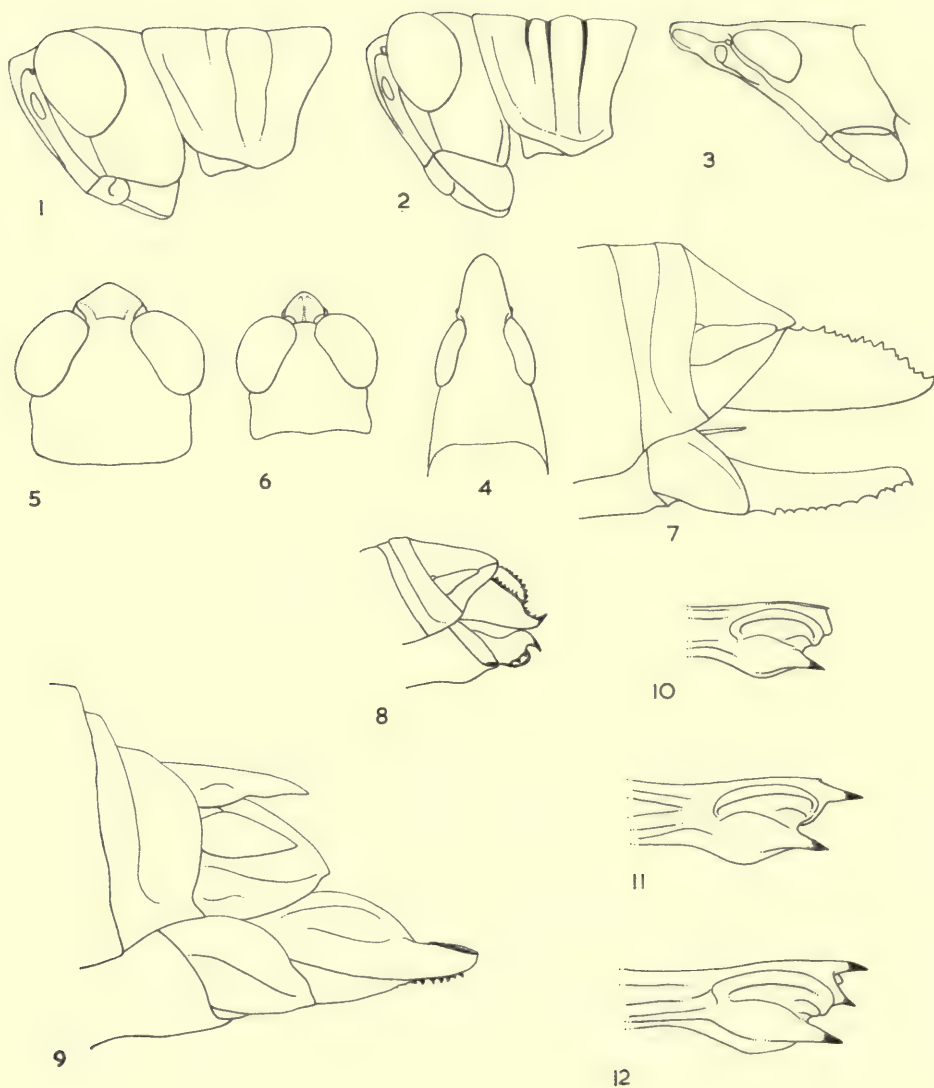
Ideally a classification should consist of monophyletic groupings which are based on uniquely derived characters. To judge whether or not any one character or group of characters be uniquely derived it is important to understand the development and function particularly in relation to behaviour of such characters.

In general apart from a few pest species, acridids are very poorly studied as live animals and any assessment of the characters used to define the Oxyinae both previously and in the present paper can only be surmise. Some observations on these characters are given below.

EPIPHALLUS (Text-figs 13, 14, 20-35, 38-69). Dirsh (1956: 233) reasonably concludes that this structure is used to depress and grasp the female subgenital plate and fix the phallus firmly during copulation; the ancorae, when present, or the anterior edge of the epiphallus achieve the fixing by either pressing against the male supra-anal plate or the dorsal surface of the phallus. In the Oxyinae the epiphallus may or may not have ancorae, also it is normally bridge-shaped and almost always completely divided. This division is interesting as it is probably a secondary development and may allow the epiphallus to be used in more than one plane, perhaps facilitating a method of copulation different from the normal acridid method. In the genus *Stolzia* this division appears much more significant as the two halves of the epiphallus are not symmetrical (Text-figs 31-35). In the genus *Oxyina* the epiphallus is almost shield-like (Text-figs 45-47) and although the main structure is divided, the epiphallic membrane is sclerotized above the dorsal margin of the epiphallus, giving the structure rigidity in one plane, a return to the normal acridid condition but by a derived method. Although considered here as a feature of the Oxyinae, a divided epiphallus also occurs in some Hemiacridinae, Coptacridinae, Catantopinae, all the Euryphyminae and in some of the South American group of genera related to *Cornops* and *Tetrataenia*, the Leptismae.

FLEXURED OR DIVIDED PENIS VALVES (Text-figs 15-19). Dirsh (1961) states that the South American group Chilacridinae and the Hemiacridinae are the only subfamilies in the Acrididae in which the genera have divided penis valves. To these must be added the group Leptismae. In some other groups the flexure is very weak and difficult to see.

Dirsh (1962) also describes some Hemiacridinae genera from Madagascar with flexured penis valves. Clearly this character is of doubtful diagnostic value. Presumably the penis valves are used to compress the spermatophore sac and



FIGS 1-12. Oxyinae genera, morphological aspects. *Cercina obtusa* Stål, 1, head and pronotum, lateral view; *Cylindrotillus versicolor* Ramme, 2, head and pronotum, lateral view; *Quiltaoryzae* Uvarov, 3, head, lateral view; 4, same, dorsal view; 11, apex of hind femur, lateral view; *Ochlandriphaga xanthelytrana* Miller, 5, head, dorsal view; *Chitaura brachyptera* I. Bolívar, 6, head, dorsal view; *Oxya agavisa* Tsai, 7, female ovipositor, lateral view; *Gesonula mundata* (Walker), 8, female ovipositor, lateral view; *Thanmoia gustavi* Ramme, 9, female ovipositor, lateral view; *Oxya chinensis* (Thunberg), 10, apex of hind femur, lateral view; *Hygracris palustris* Uvarov, 12, apex of hind femur, lateral view.

apically as an intromittant organ. The significance of divided or flexured valves is unknown. In all Oxyinae genera the valves are flexured.

GENICULAR SPINE ON HIND FEMUR (Text-figs 10–12). The function of this structure is obscure although it forms an interesting continuation of the spines on the hind tibia and possibly has a defensive function. A similar structure is common in the Eumastacids and is present in some Hemiacridinae and the South American group of genera, the Leptismae. The significance of a spined lower genicular lobe is not understood but it is notable that, in the genera *Quilta* and *Hygracris*, where the upper genicular lobe is extended this is also terminated in a spine. In other acridid groups where this genicular extension occurs, e.g. *Acanthoxia*, *Cannula*, *Amphicremna*, the lobes are rounded or angular and not at all spine-like.

OUTER APICAL SPINE OF HIND TIBIA. This structure seems to be just a continuation of the normal tibial spines. It is hardly ever present in the supposedly more highly evolved Acridids and in the Oxyinae its presence is variable. In some genera, e.g. *Oxya*, it is always present and obvious, in some it is weak, in some, e.g. *Gerista*, it is absent, but in some, e.g. *Thanmoia*, it may be present or absent, even to the extent that a specimen may have the spine on one side and absent on the other. Possibly this structure is a primitive feature which, at the Oxyinae stage of development of the Acrididae, is in the process of being lost.

EXPANSION AND FLATTENING OF HIND TIBIA. This is a feature obviously developed as an adaptation to life in marshy habitats. It has arisen several times in unrelated genera, e.g. *Oxya*, *Paulinia*, *Jasomenia* and *Paracinema*, and cannot be regarded as a uniquely derived character. However, it does seem to be a feature more or less developed in almost all Oxyinae genera, with the exception of *Pterotiltus* where, in all probability, it is secondarily lost.

VENTRAL ABDOMINAL HAIR TUFTS. Again this feature seems to be associated with life in wet habitats and probably provides buoyancy by trapping air when the grasshopper jumps into water.

OVIPOSITOR VALVES (Text-figs 7–9, 36, 37). Obviously the type of substrate in which the animal deposits its eggs has had a direct effect, through selection, on the form of the ovipositor valves. In the Oxyinae the ovipositor valves are usually slender, somewhat fragile structures with or without teeth or spines. In *Gesonula*, *Thanmoia* and *Stolzia* they have quite complicated forms and obviously oviposition sites in these genera are restricted and specialized. It has been found convenient to exclude genera from the Oxyinae which have the short, curved, unspined, robust ovipositor valves found in most Acrididae.

PROSTERNAL PROCESS. Uvarov (1966: 164) in summary suggests that this structure is an important taxonomic character, has tactile functions and is parti-

cularly important to climbing species. In the Oxyinae it is either a simple conical structure or is transverse with a narrow base and a widened, often trilobate apex. Both shapes are common in the Acrididae.

TRANSVERSE PARALLEL STRIDULATORY VEINLETS ON TEGMEN. Dirsh (1956 : 255) used this character to define the subfamily Hemiacridinae on external features. After examining a number of genera in which this structure occurs I suspect that it is a stridulatory mechanism which has evolved more than once in related groups and although generally useful in suggesting affinities with the Hemiacridinae it should not be used exclusively for that group. This character does occur in a few genera of Oxyinae, e.g. *Tauchira*, *Gesonula*, *Fer*.

In conclusion it is clear that the characters used to define the subfamily Oxyinae cannot be definitely regarded as uniquely derived, their state of apomorphy or plesiomorphy is still not clear, and no one character is exclusive to the subfamily. As the present paper bases the group on slight modifications of these characters it can be argued that little or no progress has been made and my criticisms above of the previous classifications are invalid. However, some attempt has been made to rationalize the characters used and in the taxonomic section below many genera previously grouped in the Catantopinae are now included in the Oxyinae, and some genera previously considered as Oxyinae are removed to other subfamilies. If similar studies of the Hemiacridinae, Tropidopolinae and Catantopinae other than the *Catantops* group were made a much clearer idea of the value of characters used to separate the subfamilies would emerge.

Subfamily OXYINAE

Oxyae Brunner von Wattenwyl, 1893 : 136. Type-genus: *Oxya* Audinet-Serville.
Oxyinae Brunner von Wattenwyl; Dirsh, 1961 : 400.

DIAGNOSIS. Head normally subconical in profile, rarely elongate conical; fastigium of vertex normally short, rounded triangular or pentagonal from above, rarely elongate and then only when head elongate (Text-figs 1-6); frontal ridge sulcate, usually complete to clypeus; facial carinae usually present and complete, only incomplete or absent when frontal ridge is incomplete.

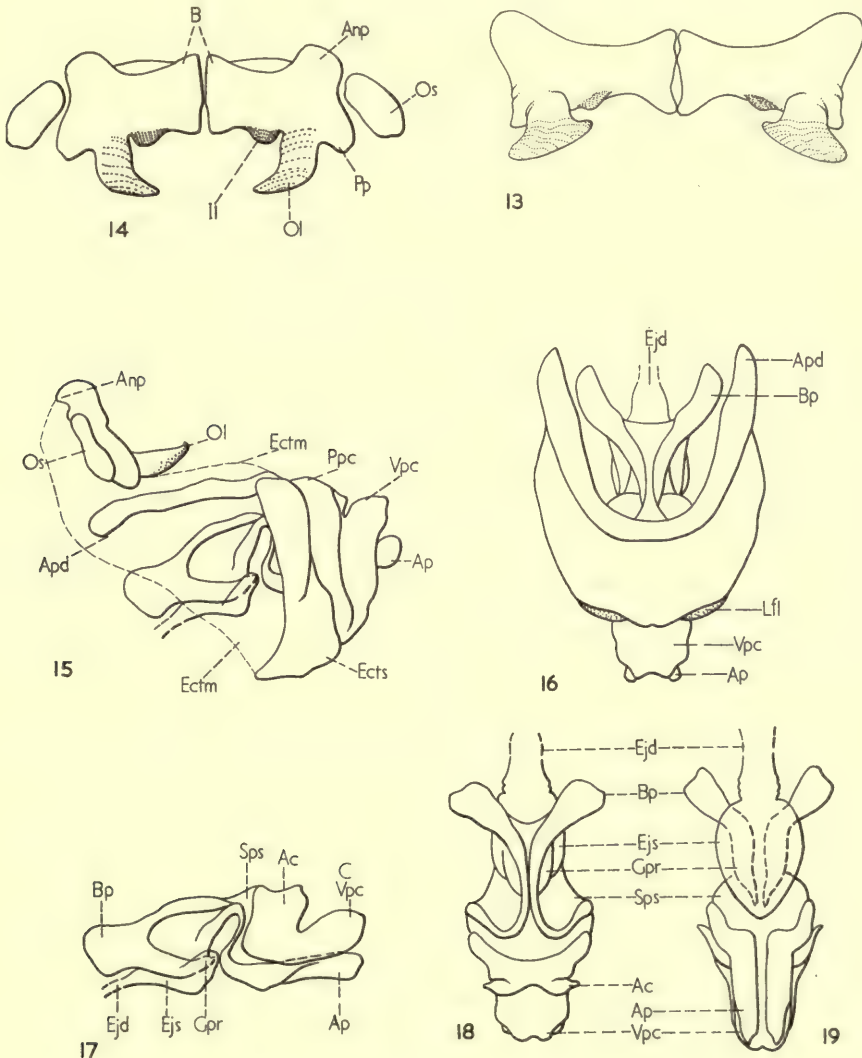
Dorsum of pronotum cylindrical or weakly flattened; median carinae linear, very weak and often incomplete, lateral carinae absent; prosternal process conical or transverse and if latter then always with narrow base; mesosternal interspace open and usually longer than wide. Tegmina and hind wings fully developed, reduced or rarely absent, tegmen sometimes with a row of transverse parallel stridulatory veinlets in the radial area. Tympanum always present. Lower genicular lobe of hind femur produced posteriorly into a spine. Hind tibia usually expanded in apical half or third, with acute upper margins; external apical spine of hind tibia present or absent.

Distal sternites of abdomen with tufts of short hairs.

Male epiphallus almost always with completely divided bridge, rarely incompletely divided, bridge usually narrow, ancorae present or absent, at least one pair of lophi present. Cingular

valves fused apically usually forming a curved plate which partially or completely covers apical penis valves (Text-figs 16-19); cingulum usually produced slightly postero-dorsally over valvular plate of cingulum; basal and apical penis valves flexured.

Female ovipositor valves almost always slender and fairly long, often with serrate margins and if curved then only apically so (Text-figs 7-9, 36, 37).



FIGS 13-19. *Oxya* species, male genitalia. *O. glabra* (Ramme), 13, epiphallus; *O. hyla* Audinet-Serville, 14, epiphallus; 15, phallic complex, entire, lateral view; 16, same, dorsal view, epiphallus and epiphallic membrane removed; 17, endophallus, lateral view; 18, same, dorsal view; 19, same, ventral view.

DISCUSSION. The subfamily is Old World in distribution and includes the following genera: *Oxya*, *Caryanda*, *Thanmoia*, *Bumacris*, *Stolzia*, *Badistica*, *Gerista*, *Pterotiltus*, *Digentia*, *Cylindrotiltus*, *Cercina*, *Fer*, *Gesonula*, *Quilta*, *Hygracris*, *Oxyina*, *Lucretilis*, *Oxytauchira*, *Tauchira*, *Chitaura* and *Ochlandriphaga*.

The genera *Gerunda* and *Racilidea* do not have spined genicular lobes of the hind femora or expanded hind tibiae and are not considered as Oxyinae. They are probably related to *Binulacris*, *Paramaga* and *Pseudogerunda*, but this whole group needs to be revised as there is probably some synonymy both at generic and specific levels.

The Australasian genera, viz. *Berminus*, *Bermiella*, *Bermioides*, *Caledonuln*, *Dapperia*, *Koscuiscula*, *Laxabilla*, *Methiola*, *Methiolopsis*, *Praxibulus*, *Tauchiridea* and *Tolgadia*, represent an interesting complex intermediate between the Hemiacridinae and the Oxyinae. As none of these genera completely fit the definition of the subfamily given above they are not considered here. I am avoiding the issue of their exact position within the Acrididae as very little material was available for study (although Dr Key of C.S.I.R.O., Canberra was kind enough to send me examples of the type-species of some of the genera concerned) and further the Australasian fauna in this group is so poorly recorded there may be presently undescribed but known material to consider. On balance I suspect these genera are more closely related to *Hieroglyphus* and *Spathosternum*. Under the present classification, therefore, they would be placed in the Hemiacridinae.

The South American group Leptismae present another interesting facet as, externally, they appear to be very closely related to the Oxyinae. Most have well developed spines on the lower genicular lobes of the hind femur and expanded hind tibiae. However, the male cercus is a peculiar shape, very reminiscent of the African subfamily Eurphyminae, and the penis valves are clearly divided. The superficial resemblance between the groups is considered here as the result of convergent evolution in unrelated groups.

KEY TO THE GENERA OF OXYINAE

- | | | |
|---|---|--------------------------------|
| 1 | Prosternal process with apex broadened and transverse, often trilobate | 2 |
| – | Prosternal process simple, conical with subacute or rounded apex, rarely with bulbous apex | 6 |
| 2 | Fully winged or brachypterous species, folded tegmina always touching in mid dorsal line. | 3 |
| – | Micropterous species | 5 |
| 3 | Integument rugulose; hind femora, particularly along carinae, with many tubercles; frontal ridge evanescent well before clypeus. | LUCRETILIS (p. 206) |
| – | Integument without tubercles; frontal ridge extending down to clypeus. | 4 |
| 4 | Tegmen without trace of transverse parallel stridulatory veinlets; external apical spine of hind tibia present. | OXYTAUCHIRA (p. 204) |
| – | Tegmen with transverse parallel stridulatory veinlets in radial area; external apical spine of hind tibia usually absent. | TAUCHIRA (p. 201) |
| 5 | Fastigium of vertex, from above, rounded triangular, as long as or almost as long as wide (Text-fig. 6); pronotum smooth. | CHITaura (p. 204) |
| – | Fastigium of vertex, from above, rounded pentagonal, much wider than long, without median longitudinal carina (Text-fig. 5); pronotum rugulose. | OCHLANDRIPHAGA (p. 207) |

Paratraulia Willemse, 1925a : 355. Type-species: *Traulia obliquiannulata* Brunner von Wattenwyl, by original designation. [Synonymised by Ramme, 1941 : 114.]

Servillenia Ramme, 1941 : 121. Type-species: *Acridium abbreviatum* Audinet-Serville, by monotypy. **Syn. n.**

DIAGNOSIS. Head conical; fastigium of vertex parabolic, wider than long, median longitudinal carinula weakly present; frontal ridge sulcate, complete to clypeus, lateral facial keels complete. Eyes normal or slightly bulbous. Antenna longer than combined lengths of head and pronotum. Prosternal process transverse, antero-posteriorly flattened, apex trilobate. Dorsum of pronotum rugulose or subrugulose, slightly flattened, median carina weak, lateral carinae absent, crossed by three transverse sulci; relative width of mesosternal interspace variable. Tegmina and hind wings fully developed or shortened to brachypterous condition; parallel transverse stridulatory veinlets present, sometimes weakly, in 1st radial or medial area. Lower genicular lobe of hind femur spined; hind tibia very weakly expanded apically, with acute upper margins; external apical spine of hind tibia absent. In male 10th abdominal tergite with a weak furcula on postero-dorsal margin; epiphallus with narrow, divided bridge and well developed ancorae. Female ovipositor valves long, evenly toothed.

DISTRIBUTION. China, W. Malaysia, W. Indonesia.

SPECIES INCLUDED

Tauchira abbreviata (Audinet-Serville) **comb. n.**

Acridium abbreviatum Audinet-Serville, 1839 : 678. Holotype ♂, JAVA (lost). Neotype ♂, JAVA (MNHM, Berlin), designated by Ramme (1941 : 123) [examined].

T. polychroa (Stål)

Oxya polychroa Stål, 1875 : 32. Holotype ♀, MALAYA (Malacca) (NR, Stockholm).

Paratraulia bifasciata Willemse, 1925a : 357, fig. Holotype ♂, MALAYA (BMNH) [examined]. [Synonymized by Willemse, 1930 : 190 (footnote).]

T. buae I. Bolívar

Tauchira buae I. Bolívar, 1898 : 92. Syntypes ♂ and ♀, SUMATRA (MCSN, Genoa; IEE, Madrid) [♂ examined].

T. obliquiannulata (Brunner von Wattenwyl)

Traulia obliquiannulata Brunner von Wattenwyl, 1898 : 249. Holotype ♀, SUMATRA (? depository).

T. rufotibialis (Willemse)

Paratraulia rufotibialis Willemse, 1925a : 358. Holotype ♀, SINGAPORE (BMNH) [examined].

Paratraulia elegantula Willemse, 1930 : 190, fig. 98. Syntypes ♂ and ♀, SUMATRA (RNH, Leiden). [Synonymised by Willemse, 1956 : 202].

T. karnyi (Willemse)

Paratraulia karnyi Willemse, 1925a : 359. Holotype ♂, MALAYA (BMNH) [examined].

T. grandiceps (Willemse)

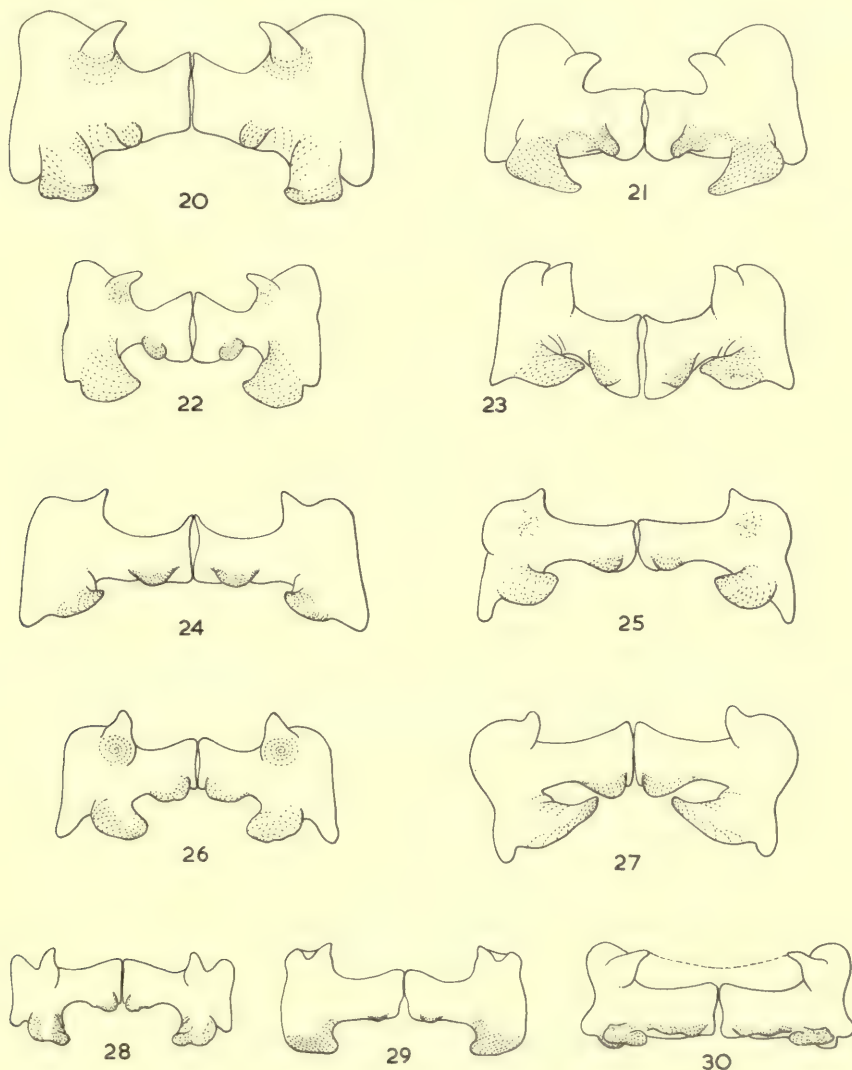
Paratraulia grandiceps Willemse, 1928 : 9. Holotype ♀, SUMATRA (RNH, Leiden).

T. gressitti Tinkham

Tauchira gressitti Tinkham, 1940 : 304, pl. 10, fig. 4, pl. 13, figs 2, 2a. Holotype ♂, CHINA (Hainan) (? depository).

DISCUSSION. The neotype male of *T. abbreviata* differs from other species of *Traulia* in that the dorsum of the pronotum is slightly less rugulose and flattened

and the parallel stridulatory veinlets of the tegmen are weaker but the latter is probably due to the shortening of the tegmen. These slight differences are not considered significant enough to warrant separate generic status for the species and *Servillenia* is synonymised with *Tauchira*.



FIGS 20-30. Oxyinae genera, male epiphalli. 20, *Thanmoia olivacea* (Willemse); 21, *T. maculata* (Willemse); 22, *T. gustavi* Ramme; 23, *Fer coeruleipennis* Willemse; 24, *Tauchira polychroa* (Stål); 25, *T. abbreviatum* (Audinet-Serville); 26, *Chitaura mirabilis* (Carl); 27, *C. lucida* (Krauss); 28, *C. indica* Uvarov; 29, *C. maculata* (Willemse); 30, *Oxytauchira aurora* (Brunner von Wattenwyl).

***Oxytauchira* Ramme, 1941**

(Text-fig. 30)

Oxytauchira Ramme, 1941 : 117. Type-species: *Tauchira gracilis* Willemse, by monotypy.

DIAGNOSIS. Head conical; fastigium of vertex, from above, parabolic, about as wide as long, median longitudinal carinula weakly present; frontal ridge sulcate, complete to clypeus; lateral facial keels complete. Eyes normal. Antenna about as long as combined lengths of head and pronotum. Prosternal process transverse, antero-posteriorly flattened, trilobate apically. Dorsum of pronotum weakly flattened, median carina weak, lateral carinae absent, shallowly crossed by three transverse sulci; mesosternal interspace longer than wide. Tegmen and hind wing fully developed, no trace of transverse parallel stridulatory veinlets on tegmen. Lower genicular lobe of hind femur spined; hind tibia hardly expanded apically but with acute upper margins, external apical spine of hind tibia present. In male 10th abdominal tergite with a furcula on postero-dorsal margin; epiphallus with narrow divided bridge and developed ancorae. Female ovipositor valves long, slender, unevenly spined.

DISTRIBUTION. Burma, Sulawesi.

SPECIES INCLUDED

***Oxytauchira gracilia* (Willemse)**

Tauchira gracilis Willemse, 1931a : 242, fig. 99. Syntypes 2 ♀, SULAWESI (Central) (NM, Basle) [1 ♀ examined].

***O. aurora* (Brunner von Wattenwyl) comb. n.**

Racilia aurora Brunner von Wattenwyl, 1893 : 155, pl. 5, fig. 53. Holotype ♂, BURMA (MCSN, Genoa).

DISCUSSION. The type of *O. aurora* was unavailable for study and the combination suggested here is based on a study of material in the BMNH collections thought to be this species. *O. aurora* is clearly not congeneric with other species of *Racilia* and the genus is returned to the Catantopinae and is thought to be related to *Gerunda*.

***Chitaura* I. Bolívar, 1918**

(Text-figs 6, 26–29)

Chitaura I. Bolívar, 1918 : 32. Type-species: *Chitaura brachyptera* I. Bolívar, designated by Willemse, 1931a : 244.

Tauracris Willemse, 1931a : 248. Type-species: *Tauracris flavolineata* Willemse, by monotypy. [Synonymised by Ramme, 1941 : 135.]

Baliacris Willemse, 1938 : 116. Type-species: *Baliacris maculata* Willemse, by monotypy. **Syn. n.**

Chिताurella Ramme, 1941 : 136. Type-species: *Tauchira lucida* Krauss, by original designation. **Syn. n.**

DIAGNOSIS. Head conical; fastigium of vertex, from above, wider than long, pentagonal or rounded triangular, median longitudinal carinula weakly present; frontal ridge sulcate,

complete to clypeus; lateral facial keels complete. Eyes normal; antenna about as long as or slightly longer than combined lengths of head and pronotum. Prosternal process antero-posteriorly flattened, trilobate apically. Dorsum of pronotum subcylindrical, median carina weak, lateral carinae absent, shallowly crossed by three transverse sulci; mesosternal interspace as long as or slightly longer than wide. Tegmina and hind wings reduced to micropterous condition, scale-like, tegmen extending to posterior margin of first abdominal sclerite. Lower genicular lobe of hind femur spined; hind tibia slightly expanded apically with acute upper margins; external apical spine of hind tibia small but usually present. In male 10th abdominal tergite with furcula on hind margin; epiphallus with divided bridge and clearly defined ancorae. Female ovipositor valves long, slender, serrated.

DISTRIBUTION. S. India, W. Indonesia, Sulawesi, Maluku.

SPECIES INCLUDED

Chitaura lucida (Krauss) **comb. rev.**

Tauchira lucida Krauss, 1903 : 760, pl. 67, fig. 7. Syntypes ♂ and ♀, JAVA (? Jena Museum).

C. mirabilis (Carl)

Tauchira mirabilis Carl, 1916 : 472. Syntypes ♂ and ♀, SULAWESI (Central) (MHN, Geneva) [examined].

C. samanga (Carl)

Tauchira samanga Carl, 1916 : 474. Holotype ♂, SULAWESI (Central) (MHN, Geneva) [examined].

C. vidua (Carl)

Tauchira vidua Carl, 1916 : 475. Holotype ♀, SULAWESI (Central) (MHN, Geneva) [examined].

C. brachyptera I. Bolívar

Chitaura brachyptera I. Bolívar, 1918 : 33. Holotype ♀, SULAWESI (North) (IEE, Madrid) [examined].

C. indica Uvarov

Chitaura (?) *indica* Uvarov, 1929 : 553. Holotype ♂, INDIA (South) (BMNH) [examined].

C. flavolineata (Willemse) **comb. n.**

Tauracris flavolineata Willemse, 1931a : 248, figs 102, 103. Holotype ♀, SULAWESI (North) (NM, Basle) [examined].

C. maculata (Willemse) **comb. n.**

Baliacris maculata Willemse, 1938 : 117. Holotype ♂, BALI I. (coll. Willemse) [examined].

C. striata Willemse

Chitaura striata Willemse, 1938 : 117. Holotype ♀, KEY Is. (RNH, Leiden).

C. elegans Ramme

Chitaura elegans Ramme, 1941 : 128. Holotype ♂, SULAWESI (South) (MNHU, Berlin) [examined].

C. atrata Ramme

Chitaura atrata Ramme, 1941 : 129. Holotype ♂, SULAWESI (Central) (MNHU, Berlin) [examined].

C. mengkoka Ramme

Chitaura mengkoka Ramme, 1941 : 131. Holotype ♂, SULAWESI (South) (MNHU, Berlin) [examined].

C. ochracea Ramme

Chitaura ochracea Ramme, 1941 : 132. Holotype ♂, SULAWESI (South) (MNHU, Berlin) [examined].

***C. moluccensis* Ramme**

Chitaura moluccensis Ramme, 1941 : 133. Holotype ♂, MALUKU (Amboina) (NM, Vienna).

***C. poecila* Ramme**

Chitaura poecila Ramme, 1941 : 131. Holotype ♂, SULAWESI (North) (MNHU, Berlin) [examined].

***C. bivittata* Ramme**

Chitaura bivittata Ramme, 1941 : 133. Holotype ♀, MALUKU (Ceram) (MNHU, Berlin) [examined].

DISCUSSION. Ramme (1941 : 135) first suggested *Tauracris* may be synonymous with *Chitaura* and after examining Willemse's type of *T. flavolineata*, a female dried from spirit, this synonymy is confirmed.

The type male of *Baliacris maculata* lacks the external apical spine on both hind tibiae but this character appears to be very unstable in *Chitaura*, often being present on one hind leg and absent on the other. In general appearance this species is very similar to *C. lucida* and, on the evidence from external morphology and the structure of the male phallic complex, is placed in *Chitaura*.

C. lucida differs slightly from the bulk of the other species of *Chitaura* in that the dorsum of the pronotum is less rounded and the transverse sulci are slightly deeper, but these features do not warrant separate generic status and it is recombined with *Chitaura*.

***Lucretilis* Stål, 1878**

(Text-fig. 55)

Lucretilis Stål, 1878 : 41, 85. Type-species: *Lucretilis taeniata* Stål, by monotypy.

DIAGNOSIS. Head conical; fastigium forming a stepped join with vertex, pentagonal from above, wider than long, median longitudinal carinula very weak or absent; frontal ridge sulcate but present only down to median ocellus; lateral facial keels absent or if present then disguised by rugulosity of facial integument. Eyes bulbous. Antenna very much longer than combined lengths of head and pronotum. Prosternal process transverse in apical half, trapezoid in anterior view. Dorsum of pronotum rugulose and coarsely pitted, rounded, shallowly crossed by three transverse sulci, median carina very weak, lateral carinae absent; mesosternal interspace longer than wide. Tegmina and hind wings somewhat reduced, extending to about half length of abdomen, former without trace of transverse parallel stridulatory veinlets. Hind femur tuberculate, lower genicular lobe spined; hind tibia very weakly expanded in apical half, upper margins acute apically; external apical spine of hind tibia present. In male 10th abdominal tergite with or without furcula on postero-dorsal margin; epiphallus with narrow divided bridge, ancorae and only an outer pair of lophi. Female ovipositor valves long, slender, completely smooth.

DISTRIBUTION. Malaysia, W. Indonesia.

SPECIES INCLUDED***Lucretilis taeniata* Stål**

Lucretilis taeniata Stål, 1878 : 85. Holotype ♂, SUMATRA (NM, Vienna).

***L. antennata* I. Bolívar**

Lucretilis antennata I. Bolívar, 1898 : 88. Holotype ♂, SUMATRA (IEE, Madrid) [examined].

***L. bolivari* Miller**

Lucretilis bolivari Miller, 1934 : 531, fig. 1, pl. 13, fig. 3. Holotype ♀, MALAYA (BMNH) [examined].

***L. uvarovi* Miller**

Lucretilis uvarovi Miller, 1935 : 695, fig. 5, pl. 14, fig. 5. Holotype ♂, MALAYA (BMNH) [examined].

***L. maculata* Willemse**

Lucretilis maculata Willemse, 1936 : 202. Holotype ♂, BORNEO (Central) (RNH, Leiden).

***L. splendens* Willemse**

Lucretilis splendens Willemse, 1938 : 118, fig. 1. Holotype ♂, BORNEO (North) (UM, Oxford) [topotypic material examined].

***L. dohrni* Ramme**

Lucretilis dohrni Ramme, 1941 : 98, pl. 13, fig. 8. Holotype ♀, SUMATRA (MNHU, Berlin) [examined].

***L. jucunda* Miller**

Lucretilis jucunda Miller, 1953 : 142, fig. 1. Holotype ♂, MALAYA (BMNH) [examined].

***Ochlandriphaga* Henry, 1933**

(Text-figs 5, 58)

Ochlandriphaga Henry, 1933 : 187. Type-species: *Ochlandriphaga xanthelytrana* Henry, by monotypy.

DIAGNOSIS. Head conical; fastigium of vertex forming stepped join with vertex, from above pentangular, without median longitudinal carinula; frontal ridge weakly sulcate, complete to clypeus; lateral facial keels weak and incomplete. Eyes bulbous. Antenna much longer than combined lengths of head and pronotum. Prosternal process antero-posteriorly flattened, with weakly trilobate apex. Dorsum of pronotum rounded, coarsely pitted, moderately deeply crossed by three transverse sulci, median carina very weak, lateral carinae absent; mesosternal interspace slightly longer than wide. Tegmina and hind wings reduced, scale-like, former not extending beyond middle of 3rd abdominal tergite. Lower genicular lobe of hind femur spined; hind tibia hardly expanded apically but dorsal margins acute in apical third; external apical spine of hind tibia present. In male 10th abdominal tergite without furcula; epiphallus with narrow, divided bridge, without ancorae and only with outer pair of lophi. Female ovipositor valves long, slender, evenly toothed.

DISTRIBUTION. Ceylon.

SPECIES INCLUDED***Ochlandriphaga xanthelytrana* Henry**

Ochlandriphaga xanthelytrana Henry, 1933 : 187, pl. 34, figs 1-5. Holotype ♂, CEYLON (BMNH) [examined].

***Thanmoia* Ramme, 1941**

(Text-figs 9, 20-22)

Thanmoia Ramme, 1941 : 119. Type-species: *Thanmoia gustavi* Ramme, by monotypy.

Annamacris Willemse, 1956 : 23. Type-species: *Annamacris olivacea* Willemse, by monotypy.

Syn. n.

Oxyacris Willemse, 1956 : 23. Type-species: *Oxyacris maculata* Willemse, by monotypy.

Syn. n.

DIAGNOSIS. Head conical; fastigium of vertex, from above, rounded pentagonal, wider than long, median longitudinal carinula absent; frontal ridge sulcate, complete to clypeus; lateral facial keels complete. Eyes normal. Antenna longer than head and pronotum combined. Prosternal process slender, conical, with subacute or rounded apex. Dorsum of pronotum from subrugulose to smooth, cylindrical or slightly flattened, median carina weak, moderately deeply or shallowly crossed by three transverse sulci, lateral carinae absent; mesosternal interspace longer than wide. Tegmina and hind wings fully developed or somewhat shortened; no trace of transverse parallel stridulatory veinlets on tegmen. Lower genicular lobe of hind femur spined; hind tibia expanded in apical half with acute upper margins; external apical spine of hind tibia absent, or very rarely present. In male 10th abdominal tergite with weak furcula on hind margin; epiphallus with narrow divided bridge and ancorae (Text-fig. 20). Female ovipositor valves long, slender, with serrate apices (Text-fig. 9), obviously highly specialized.

DISTRIBUTION. Vietnam.

SPECIES INCLUDED

Thanmoia gustavi Ramme

Thanmoia gustavi Ramme, 1941 : 120, pl. 16, fig. 5. Holotype ♀, NORTH VIETNAM (MNHU Berlin) [examined].

T. olivacea (Willemse) **comb. n.**

Annamacris olivacea Willemse, 1957 : 480. Holotype ♂, NORTH VIETNAM (MNHN, Paris) [examined].

T. maculata (Willemse) **comb. n.**

Oxyacris maculata Willemse, 1957 : 481, pl. 13, fig. 5. Holotype ♂, SOUTH VIETNAM (coll. Willemse) [examined].

DISCUSSION. Superficially these three species appear quite different; *T. gustavi* is a relatively large, robust subrugulose species with fully developed temina and hind wings; *T. maculata* is smaller, more delicate, with smooth integument and is brachypterous; *T. olivacea* is rather intermediate. The male genitalia are very similar in all three species, the epiphallus has a narrow, divided bridge, ancorae, boot-shaped outer lophi and simple inner lophi. I do not consider it necessary to retain these three species in monotypic genera and the above synonymy is made. Apart from the type-specimens there is a female paratype of *T. gustavai* in NM, Vienna and a male and two females of the same species from the type-locality in IEE, Madrid.

Fer I. Bolívar, 1918

(Text-fig. 23)

Fer I. Bolívar, 1918 : 17. Type-species: *Fer coeruleipennis* I. Bolívar, by monotypy.

DIAGNOSIS. Head conical; fastigium of vertex, from above, rounded triangular, about as wide as or slightly wider than long, median longitudinal carinula weakly present; frontal ridge sulcate, complete to clypeus; lateral facial keels complete. Eyes slightly bulbous. Antenna longer than combined lengths of head and pronotum. Prosternal process long, weakly flattened

posteriorly, slightly expanded subapically and with subacute apex. Dorsum of pronotum rugulose, slightly flattened, shallowly crossed by three transverse sulci, median carina present but weak, lateral carinae absent; mesosternal interspace longer than wide. Tegmina and hind wings fully developed, former with transverse parallel stridulatory veinlets present in 1st radial area. Lower genicular lobe of hind femur spined; hind tibia very weakly expanded in apical half, with acute upper margins apically; external apical spine of hind tibia present but very weak. In male 10th abdominal tergite with a furcula on postero-dorsal margin; epiphallus with divided bridge, developed ancorae and two pairs of lophi. Female ovipositor valves slender, evenly toothed.

DISTRIBUTION. Vietnam.

SPECIES INCLUDED

Fer coeruleipennis I. Bolívar

Fer coeruleipennis I. Bolívar, 1918 : 19. Syntypes, 1 ♂ and 1 ♀, NORTH VIETNAM (IEE, Madrid) [examined].

Gesonula Uvarov, 1940

(Text-figs 8, 44)

Gesononia Stål, 1878 : 46. Type-species: *Acridium (Oxya) punctifrons* Stål, by monotypy. [Homonym of *Gesononia* Walker, 1858 : 75.]

Gesonula Uvarov, 1940 : 174. [Replacement name for *Gesononia* Stål.]

DIAGNOSIS. Head conical; fastigium, from above, parabolic, slightly longer than the basal width, without median longitudinal carinula; frontal ridge sulcate, complete to clypeus; lateral facial keels complete. Eyes normal. Antenna slightly longer than combined length of head and pronotum. Prosternal tubercle simple, conical with rounded apex. Dorsum of pronotum flattened, shallowly crossed by three transverse sulci, median carina weak, lateral carinae absent; mesosternal interspace about as wide as long. Tegmina and hind wings fully developed, former with some transverse parallel stridulatory veinlets in 1st radial area. Lower genicular lobe of hind femur spined; hind tibia expanded in apical half, with acute upper margins; external apical spine of hind tibia present. In male postero-dorsal margin of 10th abdominal tergite with furcula fully developed, weak or absent; epiphallus with narrow divided bridge, well developed ancorae and complex lophi. Female ovipositor valves very short with short lateral and longer, curved apical spines.

DISTRIBUTION. Pakistan, eastwards to N. Australia, Solomon Is.

SPECIES INCLUDED

Gesonula punctifrons (Stål)

Acridium (Oxya) punctifrons Stål, 1861 : 336. Holotype ♂, CHINA (NR, Stockholm).

Heteracris tenuis Walker, 1870 : 668. Syntypes ♂ and ♀, CHINA (BMNH) [examined]. [Synonymised by Kirby, 1910 : 393.]

Racilia okinawensis Matsumura, 1910 : 3, pl. 4, fig 7. Syntypes ♂ and ♀, TAIWAN and JAPAN (Okinawa) (coll. Matsumura). [Synonymised by Tinkham, 1935 : 491.]

G. mundata (Walker)

Heteracris mundata Walker, 1870 : 672. Syntypes ♂ and ♀, AUSTRALIA (BMNH) [examined].

Gesononia recticercus Sjöstedt, 1920 : 21. Syntypes ♂ and ♀, AUSTRALIA (NR, Stockholm);

MNHU, Berlin) [examined]. [Synonymized by Sjöstedt, 1935 : 71.]
For subspecies of this species see Rehn, 1952.

G. rehni Akbar & Balock

Gesonula rehni Akbar & Balock, 1970 : 12, pl. 1, figs 1 A-D, pl. 2, figs 1 A-I. Holotype ♂,
PAKISTAN (University of Sind, Janshoro).

Hygracris Uvarov, 1921

(Text-figs 12, 43)

Hygracris Uvarov, 1921 : 505. Type-species: *Hygracris palustris* Uvarov, by monotypy.

DIAGNOSIS. Head conical; fastigium of vertex, from above, parabolic, wider than long, median longitudinal carinula weakly present; frontal ridge sulcate, almost complete to clypeus; lateral facial keels complete. Eyes normal. Antenna slightly longer than combined length of head and pronotum. Prosternal process moderately simple, narrow at base, expanded in apical third and bent backwards, with rounded or subacute apex. Dorsum of pronotum flattened, shallowly crossed by three transverse sulci, median carina weak, lateral carinae absent; mesosternal interspace longer than wide. Both upper and lower genicular lobes of hind femur spined; hind tibia strongly expanded in apical half, with acute upper margins; external apical spine of hind tibia absent. In male 10th abdominal tergite without a furcula; epiphallus with divided bridge, well developed ancorae and two pairs of lophi. Female ovipositor valves long, slender, evenly toothed.

DISTRIBUTION. India.

SPECIES INCLUDED

Hygracris palustris Uvarov

Hygracris palustris Uvarov, 1921 : 506. Holotype ♂, INDIA (Bengal) (BMNH) [examined].

H. malabaricus Willemse

Hygracris malabaricus Willemse, 1962 : 52, fig. 8. Holotype ♀, INDIA (South-west) (MNHN, Paris).

DISCUSSION. Superficially species of this genus most closely resemble those of *Oxya* but are easily distinguished by the acutely pointed upper genicular lobes of the hind femur. The presence of ancorae and bilobed lophi in the male epiphallus suggest a close relationship with the genera *Thanmoia*, *Fer* and perhaps *Gesonula*.

Quilta Stål, 1860

(Text-figs 3, 4, 11, 59)

Acridium (Quilta) Stål, 1861 : 337. Type-species: *Acridium (Quilta) mitratum* Stål, by monotypy.
Quilta Stål; Stål, 1873 : 80.

DIAGNOSIS. Head elongate conical; fastigium of vertex, from above, steeply parabolic, longer than wide, without median longitudinal carinula; frontal ridge sulcate, complete almost to clypeus; lateral facial keels complete. Eyes somewhat flattened. Antenna short, not

longer than combined lengths of head and pronotum. Prosternal process simple, subconical with slightly bulbous and backward pointing apex. Dorsum of pronotum flattened; median longitudinal carina very weak, barest traces of lateral carinae present, shallowly crossed by three transverse sulci; mesosternal interspace narrow, longer than wide; metasternal lobes contiguous. Tegmina and hind wings fully developed, former without trace of parallel transverse stridulatory veinlets. Both lower and upper genicular lobes of hind femur spined; hind tibia expanded strongly in apical half, with acute upper margins; external apical spine of hind tibia present. In male 10th abdominal tergite with a weak furcula on postero-dorsal margin; epiphallus with narrow divided bridge, without ancorae, and with only outer pair of lophi present. Female ovipositor valves long, upper valves smooth, lower valves weakly spined.

DISTRIBUTION. Thailand, W. Indonesia.

SPECIES INCLUDED

Quilta mitrata (Stål)

Acridium (Quilta) mitratum Stål, 1861 : 337. Syntypes ♂ and ♀, KEELING Is. (MNHU, Berlin; NR, Stockholm) [examined].

Q. oryzae Uvarov

Quilta oryzae Uvarov, 1925 : 159, figs 3-5. Holotype ♀, THAILAND (BMNH) [examined].

Q. deschauenseei Rehn

Quilta deschauenseei Rehn, 1957 : 6. Holotype ♀, THAILAND (ANS, Philadelphia).

Stolzia Willemse, 1930

(Text-figs 31-37)

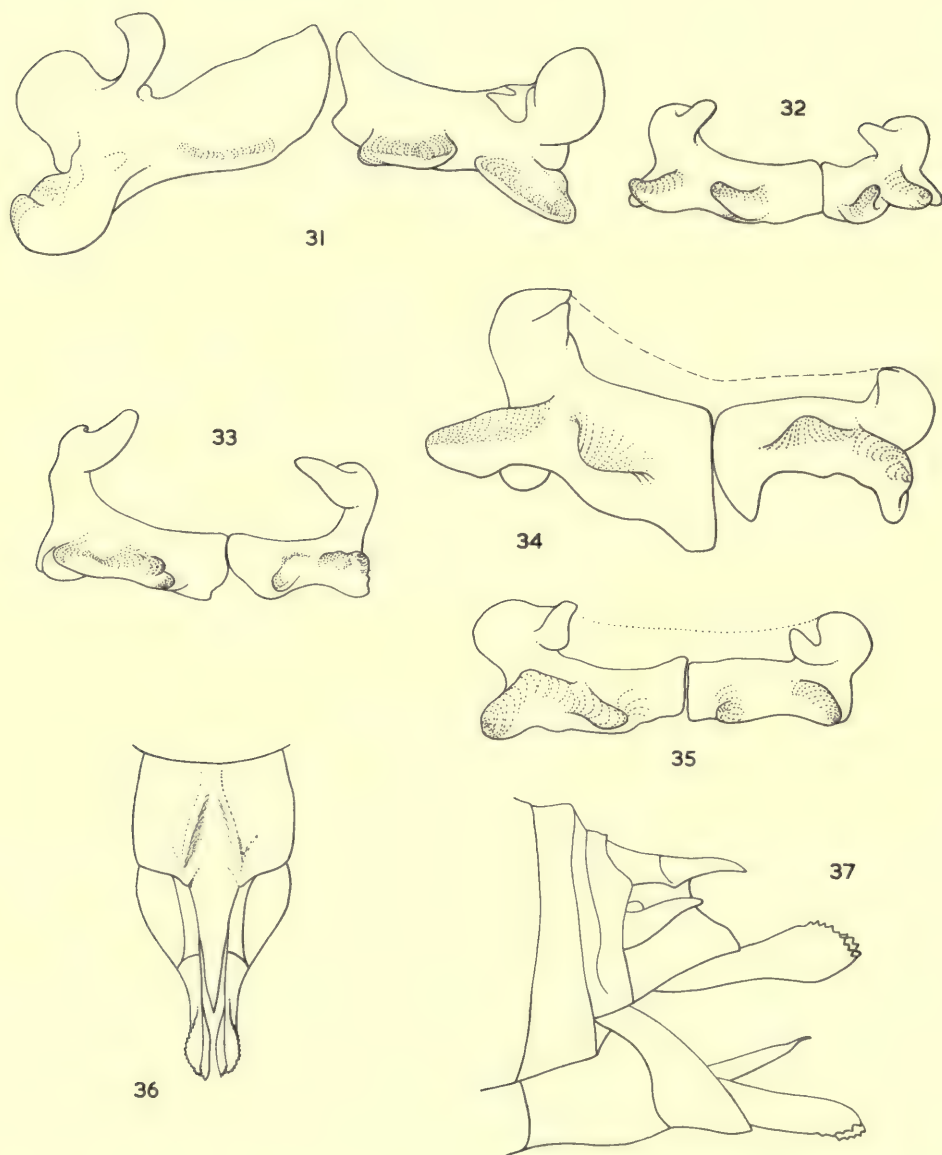
Stolzia Willemse, 1930 : 117. Type-species: *Stolzia rubromaculata* Willemse, by monotypy.

Incolacris Willemse, 1932 : 150. Type-species: *Incolacris rubritarsi* Willemse, by original designation (Willemse, 1932 : 151). **Syn. n.**

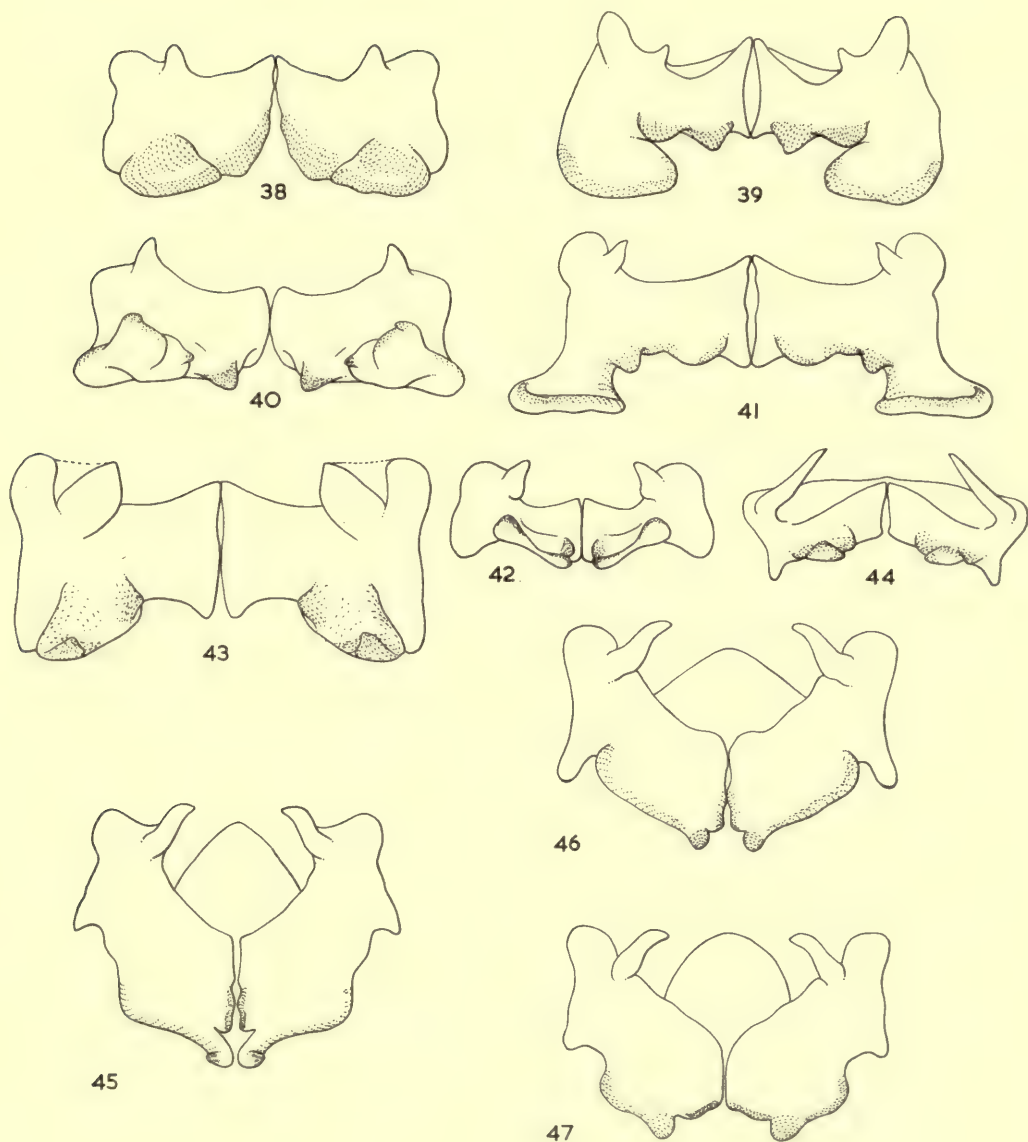
Butonacris Willemse, 1933 : 6. Type-species: *Butonacris fasciata* Willemse, by monotypy. **Syn. n.**

DIAGNOSIS. Head conical; fastigium of vertex, from above, rounded pentagonal, about as wide as long, median longitudinal carinula absent; frontal ridge sulcate, tending to evanesce below median ocellus; lateral facial keels complete. Eyes bulbous. Antenna longer than combined lengths of head and pronotum. Prosternal process short, pyramidal, apex subacute. Dorsum of pronotum rugulose, slightly flattened at least in metazona, median carina weak, lateral carinae absent, moderately deeply crossed by three transverse sulci; mesosternal interspace wider than long. Lower genicular lobe of hind femur spined; hind tibia hardly expanded apically; external apical spine of hind tibia present. In male 10th abdominal tergite with furcula on postero-dorsal margin; supra-anal plate tuberculate; epiphallus asymmetrical, left side larger and with more strongly developed lophi, with divided bridge and developed ancorae. Female ovipositor valves long and slender with apices somewhat spatulate and evenly spined.

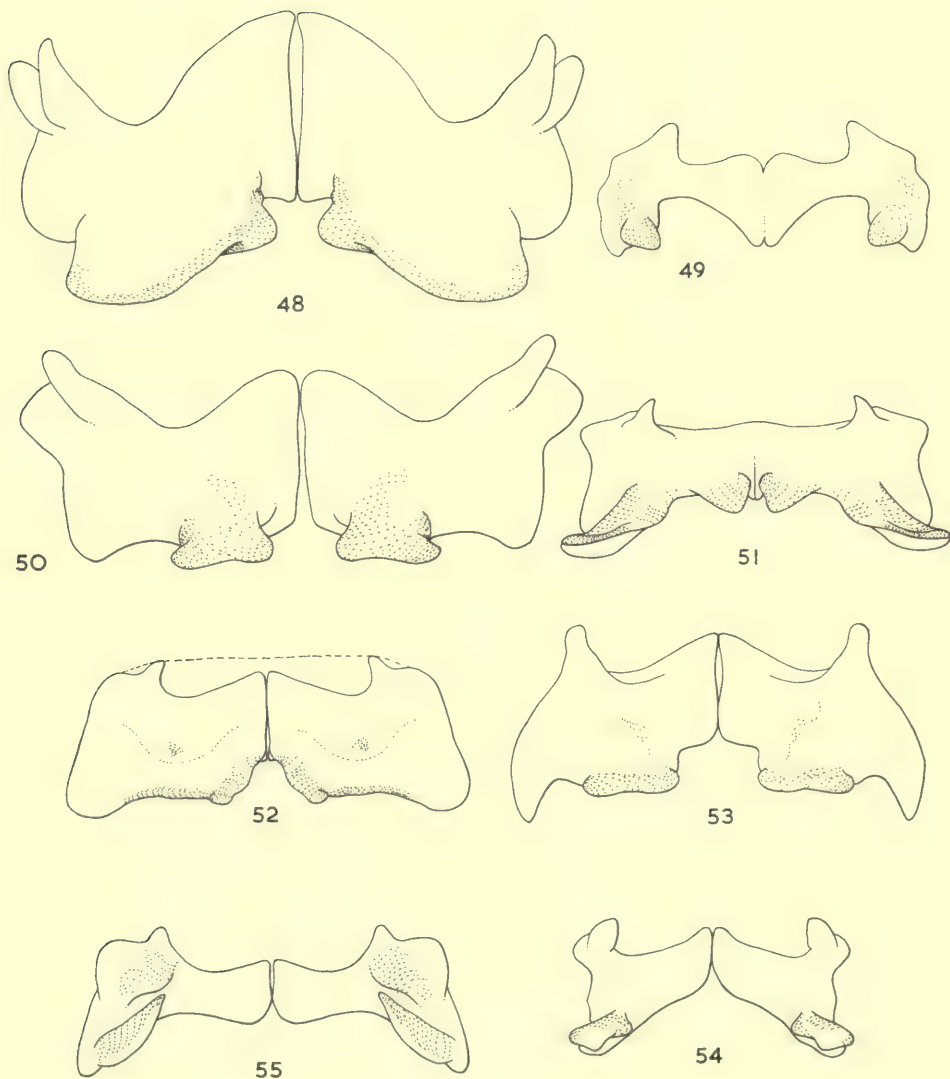
DISTRIBUTION. China, W. Indonesia, Philippine Is.



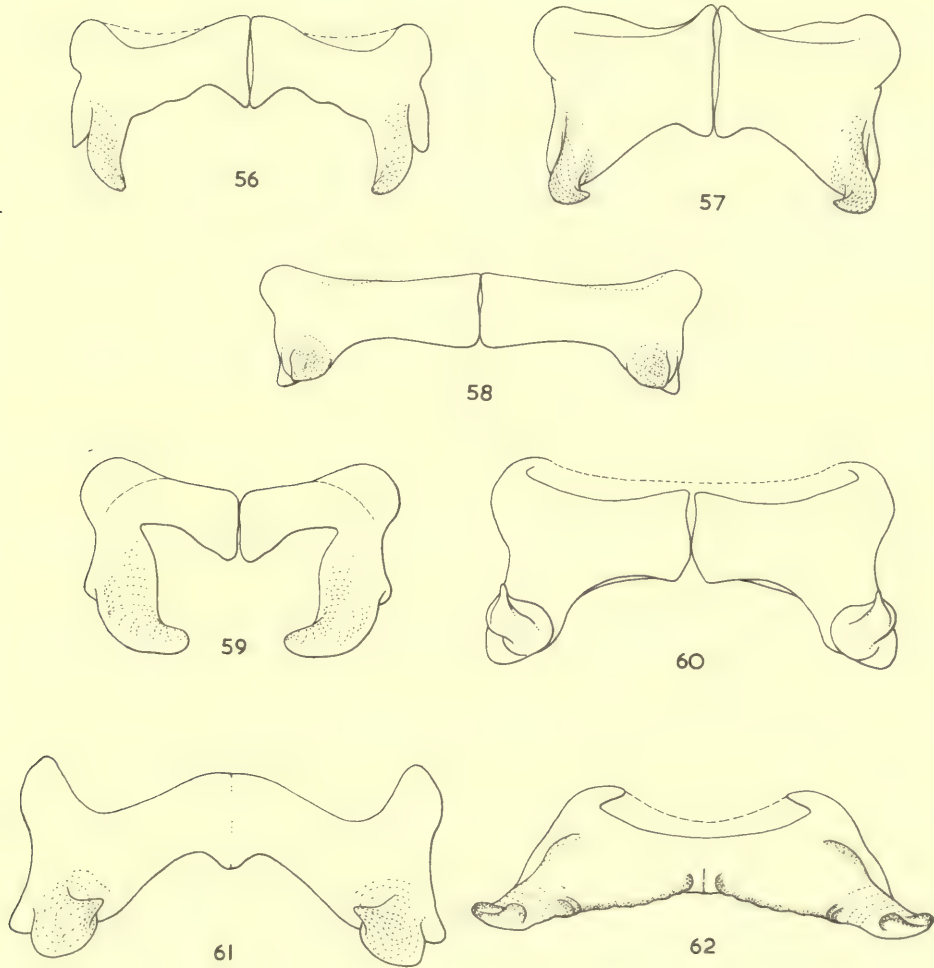
FIGS 31-37. *Stolzia* species. Male and female genitalia. *S. borneensis* (Willemse), 31, male epiphallus; *S. aberrans* (Willemse), 32, male epiphallus; *S. javana* Ramme, 33, male epiphallus; *S. trifasciata* (Willemse) 34, male epiphallus; *S. fasciata* (Willemse), 35, male epiphallus; *S. rubritarsi* (Willemse), 36, female ovipositor, ventral view; 37, same, lateral view.



FIGS 38-47. Oxyinae genera, male epiphalli. 38, *Caryanda diminuta* (Walker). 39, *C. paravicina* (Willemse); 40, *C. modesta* (Giglio-Tos); 41, *C. cylindrica* (Ramme); 42, *C. palawana* (Ramme); 43, *Hygracris palustris* Uvarov; 44, *Gesonula punctifrons* (Stål); 45, *Oxyina bidentata* (Willemse); 46, *O. javana* (Willemse); 47, *O. sinobidentata* (Hollis).



FIGS 48-55. Oxyinae genera, male epiphalli. 48, *Badistica fascipes* Chopard; 49, *B. bellula* Karsch; 50, *B. margarita* Jago; 51, *B. simpsoni* Ramme; 52, *B. ornata* I. Bolívar; 53, *B. lauta* Karsch; 54, *Gerista dimidiata* I. Bolívar; 55, *Lucretilis jucunda* Miller.



FIGS 56-62. Oxyinae genera, male epiphalli. 56, *Cercina obtusa* Stål; 57, *Bumacris flavomaculata* Willemse; 58, *Ochlandriphaga xanthelytrana* Miller; 59, *Quilta oryzae* Uvarov; 60, *Cylindrotillus versicolor* Ramme; 61, *Digentia rufogeniculata* (I. Bolívar); 62, *D. punctatissima* (Stål).

SPECIES INCLUDED

***Stolzia rubromaculata* Willemse**

Stolzia rubromaculata Willemse, 1930 : 118, fig. 58. Holotype ♂, SUMATRA (coll. Willemse) [examined].

***S. rubritarsi* (Willemse) comb. n.**

Incolacris rubritarsi Willemse, 1932 : 151. Holotype ♀, PHILIPPINE IS. (coll. Willemse) [examined].

***S. trifasciata* (Willemse) comb. n.**

Incolacris trifasciata Willemse, 1932 : 152. Holotype ♂, PHILIPPINE IS. (coll. Willemse) [examined].

***S. fasciata* (Willemse) comb. n.**

Butonacris fasciata Willemse, 1933 : 118, fig. 4. Holotype ♂, SULAWESI (Buton I.) (NM, Vienna) [examined].

Incolacris atrifrons Willemse, 1956 : 186. Holotype ♀, SULAWESI (Buton I.) (coll. Willemse) [examined]. **Syn. n.**

***S. borneensis* (Willemse) comb. n.**

Butonacris borneensis Willemse, 1938 : 83, fig. 1. Holotype ♂, BORNEO (Central) (RNH, Leiden) [1 ♂ paratype examined].

***S. aberrans* (Willemse) comb. n.**

Butonacris aberrans Willemse, 1938 : 84, fig. 2. Holotype ♂, BORNEO (Central) (coll. Willemse) [examined].

***S. nigromaculata* (Willemse) comb. n.**

Butonacris nigromaculata Willemse, 1938 : 120, fig. 5. Holotype ♂, BORNEO (North) (UM, Oxford) [could not trace].

***S. flavomaculata* (Willemse) comb. n.**

Incolacris flavomaculata Willemse, 1939 : 75, 89, fig. 3. Holotype ♀, MALAYA (Malacca) (coll. Willemse) [examined].

***S. hainanensis* (Tinkham) comb. n.**

Incolacris hainanensis Tinkham, 1940 : 302, pl. 11, fig. 2. Holotype ♂, CHINA (Hainan) (? depository).

***S. javana* Ramme**

Stolzia javana Ramme, 1941 : 101, pl. 13, fig. 5. Holotype ♀, JAVA (MNHU, Berlin) [examined].

DISCUSSION. Willemse separated *Stolzia* from *Butonacris* and *Incolacris* because of the incomplete frontal ridge of *S. rubromaculata*, and *Incolacris* species were separated on the basis of the sculpturing of the metazona. Neither of these characters is considered here to be of any significance at the generic level and the three genera are synonymized.

By far the most remarkable feature of this genus is the asymmetrical development of the male epiphallus. As far as I am aware this has not occurred in any other group of Acridoidea although it was noted, to a relatively minor extent, in *Oxya fuscovittata* (Marschall) (Hollis, 1971). Also the latter species has weakly developed tubercles on the male supra-anal plate, another feature more strongly developed in *Stolzia* species.

Caryanda Stål, 1878

(Text-figs 38-42)

Caryanda Stål, 1878 : 47. Type-species: *Acridium (Oxya) spurium* Stål, by monotypy.*Dibastica* Giglio-Tos, 1907 : 9. Type-species: *Dibastica modesta* Giglio-Tos, by monotypy.**Syn. n.***Austenia* Ramme, 1929 : 331. Type-species: *Austenia cylindrica* Ramme, by monotypy.
[Homonym of *Austenia* Nevill, 1878 : 16.] **Syn. n.***Austeniella* Ramme, 1931 : 934. [Replacement name for *Austenia* Ramme]. **Syn. n.**

DIAGNOSIS. Head conical; fastigium of vertex, from above, pentagonal, wider than long, without median longitudinal carinula; frontal ridge sulcate. Eyes normal. Antenna as long as combined lengths of head and pronotum. Prosternal process conical with subacute apex. Dorsum of pronotum weakly flattened, median carina weak, lateral carinae absent, weakly crossed by three transverse sulci; mesosternal interspace slightly longer than wide. Tegmina and hind wings normally reduced to micropterous condition, some species brachypterous and one species is rarely macropterous. Lower genicular lobe of hind femur spined; hind tibia hardly expanded apically, upper margins acute, external apical spine present. In male 10th abdominal tergite with or rarely without furcula on hind margin; epiphallus with divided bridge and clearly developed ancorae. Female ovipositor valves long, slender, evenly toothed.

DISTRIBUTION. C. Africa, India, Burma, China, Indo-China, W. Indonesia, Philippine Is.

SPECIES INCLUDED

Caryanda spuria (Stål)*Acridium (Oxya) spurium* Stål, 1861 : 336. Holotype ♂, JAVA (NR, Stockholm) [examined].*C. diminuta* (Walker) **comb. n.***Oxya diminuta* Walker, 1871 : 64. Holotype ♀, CHINA (Yunan) (BMNH) [examined].*Oxya rufipes* Brunner von Wattenwyl, 1893 : 153. Lectotype ♂, CAMBODIA (NM, Vienna), designated by Hollis (1971 : 336) [examined]. [Synonymized by Willemse, 1921 : 42].*C. sanguineoannulata* Brunner von Wattenwyl*Caryanda sanguineoannulata* Brunner von Wattenwyl, 1893 : 154, pl. 5, fig. 52. Holotype ♂, BURMA (MCSN, Genoa).*C. modesta* (Giglio-Tos) **comb. n.***Dibastica modesta* Giglio-Tos, 1907 : 10. Holotype ♀, ZAIRE (IRSNB, Brussels).*Dibastica major* I. Bolívar, 1908 : 106. Holotype ♀, ZAIRE (IRSNB, Brussels). [Synonymised by Descamps & Donskoff, 1964 : 1204].*Dibastica viridis* I. Bolívar, 1908 : 106. Holotype ♀, ZAIRE (IRSNB, Brussels). [Synonymised by Ramme, 1929 : 328].*Dibastica elegans* I. Bolívar, 1911 : 302. Holotype ♂, ZAIRE (MRAC, Tervuren). [Synonymised by Descamps & Donskoff, 1968 : 1204].*C. cachara* (Kirby)*Traulia cachara* Kirby, 1914 : 245, fig. 132. Holotype ♀, INDIA (Assam) (BMNH) [examined].*C. elegans* I. Bolívar**Caryanda elegans* I. Bolívar, 1918 : 20. Syntypes ♂ BURMA, 2 ♀ NORTH VIETNAM (IEE, Madrid) [examined, almost certainly a mixed series].

* The homonymy created here can be resolved when Dr. Fer Willemse publishes his revision of the genus.

***C. pumila* Willemse**

Caryanda pumila Willemse, 1924 : 158. Holotype ♂, SUMATRA (RNH, Leiden).

***C. paravicina* (Willemse) comb. n.**

Oxya paravicina Willemse, 1925b : 55, figs 62, 63. Holotype ♂, INDIA (North-east) (NM, Vienna) [examined].

***C. cylindrica* (Ramme) comb. n.**

Austenia cylindrica Ramme, 1929 : 332, pl. 7, figs 10, 11; figs 46a, 47a, 48a. Holotype ♂, SIERRA LEONE (BMNH) [examined].

***C. methiola* Chang**

Caryanda methiola Chang, 1939 : 43, pl. 1, figs 5, 6, 9, pl. 3, fig. 4. Holotype ♀, CHINA (Szechwan) (USNM Washington).

***C. sinensis* Chang**

Caryanda sinensis Chang, 1939 : 45, pl. 1, figs 3, 4, 7, pl. 3, fig. 2. Holotype ♀, CHINA (Szechwan) (USNM, Washington).

***C. omeiensis* Chang**

Caryanda omeiensis Chang, 1939 : 47, pl. 1, fig. 8. Holotype ♀, CHINA (Szechwan) (USNM, Washington).

***C. pieli* Chang**

Caryanda pieli Chang, 1939 : 48, pl. 2, figs 1-4, pl. 3, figs 1, 7. Holotype ♀, CHINA (Chekiang) (? depository).

***C. palawana* (Ramme) comb. n.**

Chitaurella palawana Ramme, 1941 : 137. Holotype ♂, PHILIPPINE IS. (Palawan) (NM, Vienna) [examined].

***C. olivacea* Willemse**

Caryanda olivacea Willemse, 1956 : 168. Holotype ♂, NORTH VIETNAM (NM, Vienna) [examined].

SPECIES DOUBTFULLY INCLUDED

***C. pulchra* Brancsik**

Caryanda pulchra Brancsik, 1897 : 74, pl. 3, figs 17a, b. Holotype ♂, NEW GUINEA (probably lost).

***C. flavomaculata* I. Bolívar**

Caryanda flavomaculata I. Bolívar, 1918 : 21. Holotype ♂, NEW GUINEA (IEE, Madrid) [examined].

DISCUSSION. There seems to be no valid reason on the basis of external morphology or in the structure of the male phallic complex why *Austeniella* and *Dibastica* should remain separate from *Caryanda* and they are therefore synonymised.

As mentioned in my earlier paper on *Oxya* (Hollis, 1971) that genus was considered to be a somewhat heterogeneous assemblage of species and some rearrangement would be necessary. *O. paravicina* and *O. diminuta* clearly differ from other species of *Oxya* (sensu stricto) in that a male furcula is present and the epiphallus bears ancorae. These two species are considered here more naturally grouped in *Caryanda*.

Chitaurella palawana is clearly not congeneric with *C. lucida* Krauss, having a simple, conical prosternal process. It seems to be more closely allied to the *Caryanda*

species and is placed in that genus. The holotype male has the external apical spine of the hind tibia present only on the right side, but another male from Palawan, deposited in MNHN, Paris, has the spine on both tibiae.

The identity of *Caryanda pulchra* will remain obscure until topotypic material becomes available for study.

Caryanda flavomaculata differs from the rest of the genus in having deep transverse sulci on the pronotum, the male furcula is absent, the epiphallus lacks ancorae and is very similar to the type found in *Oxya*. In view of these differences it is likely that *C. flavomaculata* should be placed in another genus but, as it is only known from a discoloured male dried from alcohol, there is insufficient information available and the current combination is maintained.

Gerista I. Bolívar, 1905

(Text-fig. 54)

Gerista I. Bolívar, 1905 : 233. Type-species: *Gerista dimidiata* I. Bolívar, by monotypy.

DIAGNOSIS. Head conical; fastigium, from above, rounded pentagonal, wider than long, median longitudinal carinula absent; frontal ridge sulcate, evanescent below median ocellus; lateral facial keels complete. Eyes bulbous. Antenna longer than combined lengths of head and pronotum. Prosternal process conical with subacute apex. Dorsum of pronotum slightly flattened, shallowly crossed by three transverse sulci, median carina weak, lateral carinae absent; mesosternal interspace about as long as wide. Tegmina and hind wings reduced, former extending only half-way along abdomen and without trace of transverse parallel stridulatory veinlets. Lower genicular lobe of hind femur spined; hind tibia expanded in apical part, with acute upper margins apically; external apical spine of hind tibia absent. In male 10th abdominal tergite without a furcula; epiphallus with divided bridge, ancorae and only an outer pair of lophi. Female ovipositor valves long, slender, evenly toothed.

DISTRIBUTION. Nigeria, Fernando Po.

SPECIES INCLUDED

Gerista dimidiata I. Bolívar

Gerista dimidiata I. Bolívar, 1905 : 234. Holotype ♂, FERNANDO PO (IEE, Madrid) [examined].

DISCUSSION. *Gerista* is the only African genus in the Oxyinae lacking the external apical spines of the hind tibia. However, this feature is not regarded as very significant here and, on the evidence from the form of the male epiphallus, *Gerista* appears most closely related to the *lauta* species-group of *Badistica*.

The female of this species was described by Jago (1962) from the Benin forest region of Nigeria but it may be that Jago's material represents a mainland species distinct from that found on Fernando Po.

***Badistica* Karsch, 1891**

(Text-figs 48–53)

Badistica Karsch, 1891 : 194. Type-species: *Badistica bellula* Karsch, by monotypy.

DIAGNOSIS. Head conical; fastigium, from above, pentagonal, wider than long, median longitudinal carinula absent; frontal ridge sulcate, complete to clypeus or evanescent below median ocellus; lateral facial keels complete. Eyes moderately bulbous. Antenna longer than combined lengths of head and pronotum. Prosternal process conical with subacute apex. Dorsum of pronotum rounded or slightly flattened, shallowly or more deeply crossed by three transverse sulci, median carina weak, lateral carinae absent; mesosternal interspace longer than wide. Tegmina and hind wings very reduced, scale-like. Lower genicular lobe of hind femur spined; hind tibia hardly expanded apically, upper margins hardly angular; external apical spine of hind tibia present. In male 10th abdominal tergite with or without furcula on postero-dorsal margin; epiphallus with partially or completely divided bridge, ancrae more or less developed. Female ovipositor valves long, slender, smooth, finely serrate in apical quarter or evenly toothed in apical half.

DISTRIBUTION. W. Africa.

SPECIES INCLUDED

***Badistica bellula* Karsch**

Badistica bellula Karsch, 1891 : 195, figs. Syntypes ♂ and ♀, CAMEROUN (MNHU, Berlin) [examined].

***B. lauta* Karsh**

Badistica lauta Karsch, 1896 : 282, figs 16, 16a. Lectotype ♂, TOGO (MNHU, Berlin), designated by Jago (1966 : 340) [examined].

***B. ornata* I. Bolívar**

Badistica ornata I. Bolívar, 1905 : 229. Holotype ♂, GHANA (MNHU, Berlin) [examined].

***B. simpsoni* Ramme**

Badistica simpsoni Ramme, 1929 : 336, figs 52b, 53b. Holotype ♂, SIERRA LEONE (BMNH) [examined].

***B. fascipes* Chopard**

Badistica fascipes Chopard, 1958 : 128, fig. 1. Holotype ♀, GUINEA: Mt. Nimba (MNHN, Paris).

***B. margarita* Jago**

Badistica margarita Jago, 1966 : 331, figs 1A, 1B, 2A. Holotype ♂, GHANA (BMNH) [examined].

DISCUSSION. Jago (1966) suggests *bellula* and *simpsoni* form one species-group and *lauti*, *fascipes* and *margarita* another, with *ornata* rather intermediate. *B. bellula* and *simpsoni* are distinct from the other species of the genus in that the male epiphallus is incompletely divided (Text-figs 49, 51), a feature altogether rare in the whole subfamily. Furthermore, in these two species the pronotum is flatter and less 'waisted'. Whether these differences are due to divergence within the genus or convergence of two lines of evolution remains uncertain.

***Oxya* Audinet-Serville, 1831**

(Text-figs 7, 10, 13–19)

Oxya Audinet-Serville, 1831 : 286. Type-species: *Oxya hyla* Audinet-Serville, by monotypy. *Zulua* Ramme, 1929 : 327. Type-species: *Zulua glabra* Ramme, by monotypy. **Syn. n.**

DIAGNOSIS. Head conical; fastigium, from above, rounded pentagonal, wider than long, with weak or without median longitudinal carinula; frontal ridge sulcate, complete to clypeus; lateral facial keels complete. Eyes normal. Antenna longer or shorter than combined lengths of head and pronotum. Prosternal process conical with subacute or rounded apex. Dorsum of pronotum flattened or slightly rounded, weakly crossed by three transverse sulci, median carina weak, lateral carinae absent; mesosternal interspace longer than wide. Tegmina and hind wings fully developed or reduced to brachypterous condition, former always touching in mid dorsal line when folded and without trace of transverse parallel stridulatory veinlets. Lower genicular lobe of hind femur spined; hind tibia expanded in apical half and with acute upper margins. In male 10th abdominal tergite without furcula; epiphallus with divided bridge, without ancorae and with two pairs of lophi. Female ovipositor valves long, slender, unevenly spined or evenly serrate.

DISTRIBUTION. Ethiopian, S.E. Palaearctic, Oriental, Austro-Oriental, Australasian regions.

SPECIES INCLUDED

(For synonymy and subspecies of these species see Hollis, 1971)

Oxya velox (Fabricius)

Gryllus velox Fabricius, 1787 : 239. Lectotype ♀, CHINA (UZM, Copenhagen), designated by Hollis (1971 : 297) [examined].

O. chinensis (Thunberg)

Gryllus chinensis Thunberg, 1815 : 253. Holotype ♀, CHINA (ZIUU, Uppsala) [examined].

O. japonica (Thunberg)

Gryllus japonicus Thunberg, 1824 : 429. Holotype ♀, JAPAN (ZIUU, Uppsala) [examined].

O. hyla Audinet-Serville

Oxya hyla Audinet-Serville, 1831 : 287. Neotype ♂, SENEGAL (MNHN, Paris), designated by Hollis (1971 : 282) [examined].

O. fuscovittata (Marschall)

Gryllus fuscovittatus Marschall, 1836 : 211, pl. 18, fig. 3. Holotype ♀, no data [probably N.W. India] (NM, Vienna) [examined].

O. nitidula (Walker)

Acridium nitidulum Walker, 1870 : 631. Holotype ♀, INDIA (South) (BMNH) [examined].

O. cyanoptera Stål **comb. rev.**

Oxya cyanoptera Stål, 1873 : 83. Holotype ♀, SIERRA LEONE (NR, Stockholm) [examined].

O. cyanipes (Karny) **comb. n.**

Catantops cyanipes Karny, 1907 : 330, pl. 2, figs 11-15. Holotype ♂, UGANDA (NM, Vienna) [examined].

O. yezoensis Shiraki

Oxya yezoensis Shiraki, 1910 : 43. Neotype ♂, JAPAN (ZIHU, Sapporo), designated by Hollis (1971 : 326) [examined].

O. minuta Carl

Oxya minuta Carl, 1916 : 472. Lectotype ♂, JAVA (MNH, Geneva), designated by Hollis (1971 : 293) [examined].

O. grandis Willemse

Oxya grandis Willemse, 1925b : 36, figs 34, 35. Holotype ♂, INDIA (BMNH) [examined].

***O. glabra* (Ramme) comb. n.**

Zulua glabra Ramme, 1929 : 327, pl. 3, figs 3, 4, fig. 44. Holotype ♂, SOUTH AFRICA, (BMNH) [examined].

***O. agavis* Tsai**

Oxya agavis Tsai, 1931 : 437, fig. 1. Holotype ♀, CHINA (MNHU, Berlin) [examined].

***O. ningpoensis* Chang**

Oxya ningpoensis Chang, 1934 : 190, figs 1-3. Syntypes ♂ and ♀, CHINA (partly in BMNH) [partly examined].

***O. stresemanni* Ramme**

Oxya stresemanni Ramme, 1941 : 213. Holotype ♂, SULAWESI (MNHU, Berlin) [examined].

***O. oxyura* Uvarov comb. rev.**

Oxya oxyura Uvarov, 1953 : 68, fig. 71. Holotype ♂, ANGOLA, (BMNH) [examined].

***O. bolaangensis* Hollis**

Oxya bolaangensis Hollis, 1971 : 312, figs 25, 138, 150-159. Holotype ♂, SULAWESI (coll. Willemse) [examined].

DISCUSSION. When *Oxya* was revised by the author (Hollis, 1971) it was realised that some of the species then included in the genus would have to be removed to other genera and this is done here with the removal of *O. diminuta* and *O. paravicina* to *Caryanda* (p. 217), and *O. bidentata*, *sinobidentata* and *javana* to the new genus *Oxyina* (p. 228). It was also noted that the position of *Zulua*, a purely African genus, as a discrete taxon, was not satisfactory. *Zulua* was differentiated by Dirsh (1965 : 235) from *Oxya* by its more acute head profile, shorter antennae, the presence of a weak median longitudinal carinula on the fastigium, the subcylindrical pronotum and a tendency to shortened elytra. These features, although serving to separate *Zulua* species from *Oxya hyla hyla*, break down when *Zulua* is compared with the Oriental *Oxya* species and the two genera are synonymised.

***Bumacris* Willemse, 1931**

(Text-fig. 57)

Bumacris Willemse, 1931b : 348. Type-species: *Bumacris flavomaculata* Willemse, by monotypy.

DIAGNOSIS. Head conical; fastigium of vertex, from above, pentagonal, wider than long, without median longitudinal carinula; frontal ridge sulcate, complete almost to clypeus; lateral facial keels complete. Eyes bulbous. Antenna longer than combined lengths of head and pronotum. Prosternal process conical with subacute apex. Dorsum of pronotum rounded or weakly flattened, shallowly or more deeply crossed by three transverse sulci, median carina weak, lateral carinae absent; mesosternal interspace as long as or slightly longer than wide. Tegmina and hind wings fully developed or slightly reduced and only extending two-thirds the length of abdomen; no trace of transverse parallel stridulatory veinlets. Lower genicular lobe of hind femur spined; hind tibia expanded in apical half, and with acute upper margins; external apical spine of hind tibia present. In male 10th abdominal tergite without furcula; epiphallus with broad, divided bridge, without ancorae and with only the outer pair of lophi. Female ovipositor valves very long, slender, evenly toothed.

DISTRIBUTION. Solomon Is.

SPECIES INCLUDED

***Bumacris flavomaculata* Willemse**

Bumacris flavomaculata Willemse, 1931b : 350, fig. 4. Holotype ♂, SOLOMON Is. (Malaita) (NM, Basle).

***B. monotona* Willemse**

Bumacris monotona Willemse, 1935b : 166. Holotype ♀, SOLOMON Is. (Guadalcanal) (BMNH) [examined].

***B. pagdeni* Willemse**

Bumacris pagdeni Willemse, 1935b : 167. Holotype ♂, SOLOMON Is. (Vella Lavella) (BMNH) [examined].

***B. leveri* Uvarov**

Bumacris leveri Uvarov, 1937 : 17. Holotype ♀, SOLOMON Is. (Isabel) (BMNH) [examined].

***B. bougainvillea* Ramme**

Bumacris bougainvillea Ramme, 1941 : 118. Holotype ♂, SOLOMON Is. (Bougainville) (MNHU, Berlin).

***B. georgica* Willemse**

Bumacris georgica Willemse, 1962 : 51, fig. 4. Holotype ♂, SOLOMON Is. (St. George) (MNHN, Paris).

DISCUSSION. Dr Fer Willemse will shortly be publishing a thorough revision of this genus.

***Digentia* Stål, 1878**

(Text-figs 61, 62)

Digentia Stål, 1878 : 47. Type-species: *Oxya punctatissima* Stål, by monotypy.

Genditia I. Bolívar, 1911 : 301. Type-species: *Genditia rufogeniculata* I. Bolívar, by monotypy.

Syn. n.

DIAGNOSIS. Head conical; fastigium, from above, rounded pentagonal, wider than long, with or without median longitudinal carinula; frontal ridge sulcate, complete to clypeus; lateral facial keels complete. Eyes moderately bulbous. Antenna longer than combined lengths of head and pronotum. Prosternal process simple, conical with subacute apex. Dorsum of pronotum rugulose and coarsely pitted, rounded or weakly flattened, moderately deeply crossed by three transverse sulci; median carina weak, lateral carinae absent; mesosternal interspace about as wide as long. Tegmina and hind wings very reduced, former minute and not extending beyond mesonotum or scale-like and extending to 1st abdominal tergite. Lower genicular lobe of hind femur spined; hind tibia weakly or moderately expanded in apical part and with acute upper margins apically; external apical spine of hind tibia present. In male posterodorsal margin of 10th abdominal tergite with a weak furcula or if without then it is expanded dorso-laterally; epiphallus with incompletely divided bridge and without ancorae. Female ovipositor valves long, slender, smooth or evenly and weakly serrate in apical half.

DISTRIBUTION. W. and C. Africa.

SPECIES INCLUDED

***Digentia punctatissima* (Stål)**

Oxya punctatissima Stål, 1875 : 33. Holotype ♂, W. AFRICA (NR, Stockholm) [examined].

***D. rufogeniculata* (I. Bolívar) comb. n.**

Genditia rufogeniculata I. Bolívar, 1911 : 301. Holotype ♀, ZAIRE (Kasai) (MRAC, Tervuren).

***D. fasciata* Ramme**

Digentia fasciata Ramme, 1929 : 323, figs 40, 41b. Holotype ♂, CAMEROUN (MNHU, Berlin) [examined].

***D. karnyi* Ramme sp. rev.**

Digentia karnyi Ramme, 1929 : 331, pl. 7, fig. 9. Holotype ♀, ZAIRE (MRAC, Tervuren) [1 ♀ paratype examined].

DISCUSSION. Prior to this review *Digentia* included two recognised species, the type-species *punctatissima* and *fasciata*. *Genditia* was erected for *rufogeniculata* and Dirsh (1952) added *versicolor* (Ramme). Considering the two type-species there seem to be no differences upon which to base a generic separation. *D. punctatissima* has more reduced organs of flight, less expanded hind tibiae and smooth ovipositor valves, features which can be clearly associated with a more or less complete adaptation to a forest habitat. Furthermore, as both *punctatissima* and *rufogeniculata* have the male epiphallus with an incompletely divided bridge, the two genera are synonymised. *D. versicolor* is significantly different from the two former species as the male epiphallus has a completely divided bridge, the integument is much less coarsely pitted, the antennae are very short and the overall appearance is very different to the other *Digentia* species. It is therefore removed from *Digentia* and replaced in its original combination as *Cylindrotiltus versicolor* Ramme, 1929.

In the female paratype of *Digentia karnyi* Ramme the tegmina appear narrower than in *rufogeniculata*, also the posterior margin of the subgenital plate is sharply triangular and the ventral concavity more rounded. For these reasons Dirsh's synonymy (1952 : 268) is not accepted.

***Cercina* Stål, 1878**

(Text-figs 1, 56)

Cercina Stål, 1878 : 49, 97. Type-species: *Cercina obtusa* Stål, by monotypy.

Cledra I. Bolívar, 1918 : 25. Type-species: *Cledra simoni* I. Bolívar, by monotypy. [Synonymised by Uvarov, 1927 : 105.]

DIAGNOSIS. Head conical; fastigium, from above, short triangular or pentagonal, wider than long, median longitudinal carinula absent; frontal ridge weakly sulcate and not quite extending to clypeus; lateral facial keels complete. Eyes normal. Antenna shorter than combined lengths of head and pronotum. Prosternal process subconical, antero-posteriorly flattened with subacute apex. Dorsum of pronotum flattened, shallowly crossed by two or three transverse sulci, median carina very weak, lateral carinae absent; mesosternal interspace longer than wide. Tegmina and hind wings reduced, scale-like, former not extending beyond 3rd abdominal tergite. Lower genicular lobe of hind femur pointed or spined; hind tibia moderately expanded in apical half; with acute upper margins; external apical spine of hind tibia present. In male 10th abdominal tergite without furcula; epiphallus with narrow divided bridge, without ancorae and with only the outer pair of lophi. Female ovipositor valves long, slender, evenly toothed.

DISTRIBUTION. Ceylon.

SPECIES INCLUDED

***Cercina obtusa* Stål**

Cercina obtusa Stål, 1878 : 97. Holotype ♀, CEYLON (NM, Vienna).

Cledra simoni I. Bolívar, 1918 : 26. Holotype ♂, CEYLON (IEE, Madrid) [examined].
[Synonymised by Uvarov, 1927 : 105].

Caryanda platycera Willemse, 1924 : 157, fig. 1. Holotype ♂, CEYLON (NM, Vienna) [examined]. **Syn. n.**

***C. phillipsi* Henry**

Cercina phillipsi Henry, 1933 : 184, pl. 33, figs 1, 2. Holotype ♂, CEYLON, (BMNH) [examined].

DISCUSSION. An examination of the type of *Caryanda platycera* has shown that this species should be transferred to *Cercina* and that it is synonymous with *C. obtusa*

***Cylindrotiltus* Ramme, 1929 gen. rev.**

(Text-figs 2, 60)

Cylindrotiltus Ramme, 1929 : 319. Type-species: *Cylindrotiltus versicolor* Ramme, by monotypy.

DIAGNOSIS. Head conical; fastigium, from above, rounded pentagonal, wider than long, without median longitudinal carinula; frontal ridge sulcate, evanescent just above clypeus; lateral facial keels complete. Eyes moderately bulbous. Antenna not longer than combined lengths of head and pronotum. Prosternal process conical, posteriorly flattened, with subacute apex. Dorsum of pronotum with smooth shiny integument except in metazona where it is more coarsely pitted, rounded, deeply crossed by three transverse sulci; median carina almost completely absent, lateral carinae absent; mesosternal interspace as wide as or longer than wide. Tegmina and hind wing reduced, scale-like, former only just extending beyond hind margin of 1st abdominal tergite. Lower genicular lobe of hind femur spined; hind tibia slightly expanded in apical half and with acute upper margins; external apical spine of hind tibia present. In male 10th abdominal tergite without furcula; epiphallus with divided bridge, without ancorae. Female ovipositor valves long, slender, evenly and finely serrate.

DISTRIBUTION W. Africa.

SPECIES INCLUDED

***Cylindrotiltus versicolor* Ramme comb. rev.**

Cylindrotiltus versicolor Ramme, 1929 : 320, figs 37, 38, pl. 6, figs 24, 25. Holotype ♂, CAMEROUN (MNHU, Berlin) [examined].

DISCUSSION. The reasons for resurrecting this monobasic genus from synonymy with *Genditia* are given on p. 224. Very little is known of the biology of *C. versicolor* but it would appear to be a forest-living species. On the evidence from external morphology and the male phallic complex it seems to be most closely related to *Pterotiltus*, being a little less specialised to forest life than the latter.

***Pterotiltus* Karsch, 1893**

(Text-figs 63-69)

Pygostolus Karsch, 1891 : 192. Type-species: *Pygostolus impennis* Karsch, by monotypy.
[Homonym of *Pygostolus* Haliday, 1833 : 263].

Pterotiltus Karsch, 1893 : 108. [Replacement name for *Pygostolus* Karsch.]

DIAGNOSIS. Head conical; fastigium, from above, pentagonal, about as wide as long, median longitudinal carinula weakly present or absent; frontal ridge sulcate, evanescent below median ocellus; lateral facial keels complete. Eyes bulbous. Antenna longer than combined lengths of head and pronotum. Prosternal process simple, conical with acute apex. Dorsum of pronotum cylindrical, deeply crossed by three transverse sulci, median carina very weak, lateral carinae absent; mesosternal interspace as wide as or longer than wide. Tegmina and hind wings extremely reduced, represented by small folds of integument on meso- and metathorax. Lower genicular lobe of hind femur spined; hind tibia not expanded apically and with rounded margins; external apical spine of hind tibia present. In male postero-dorsal margin of 10th abdominal tergite with a furcula or an unpaired structure resulting from fusion of the two lobes of furcula; epiphallus with divided bridge, without ancorae and with one or two pairs of lophi. Female ovipositor valves long, slender, smooth.

DISTRIBUTION. W. and C. Africa.

SPECIES INCLUDED

***Pterotiltus impennis* (Karsch)**

Pygostolus impennis Karsch, 1891 : 193, figs. Syntypes ♂ and ♀, CAMEROUN (MNHU, Berlin) [examined].

***P. inuncatus* (Karsch)**

Pygostolus inuncatus Karsch, 1892 : 72. Syntypes ♂ and ♀, CAMEROUN (MNHU, Berlin) [examined].

***P. miniatulus* Karsch**

Pterotiltus miniatulus Karsch, 1893 : 108. Syntypes ♂ and ♀, Togo (MNHU, Berlin) [examined].

***P. finoti* Dominique**

Pterotiltus finoti Dominique, 1900 : 207, pl. 3, figs 11-13. Holotype ♂, CONGO (BRAZZAVILLE) (? Nantes Museum).

***P. apicalis* I. Bolívar**

Pterotiltus apicalis I. Bolívar, 1905 : 226. Holotype ♀, FERNANDO PO (IEE, Madrid) [examined].

***P. coeruleocephalus* I. Bolívar**

Pterotiltus coeruleocephalus I. Bolívar, 1905 : 227. Holotype ♂, CAMEROUN (IEE, Madrid) [examined].

***P. femoratus* Ramme**

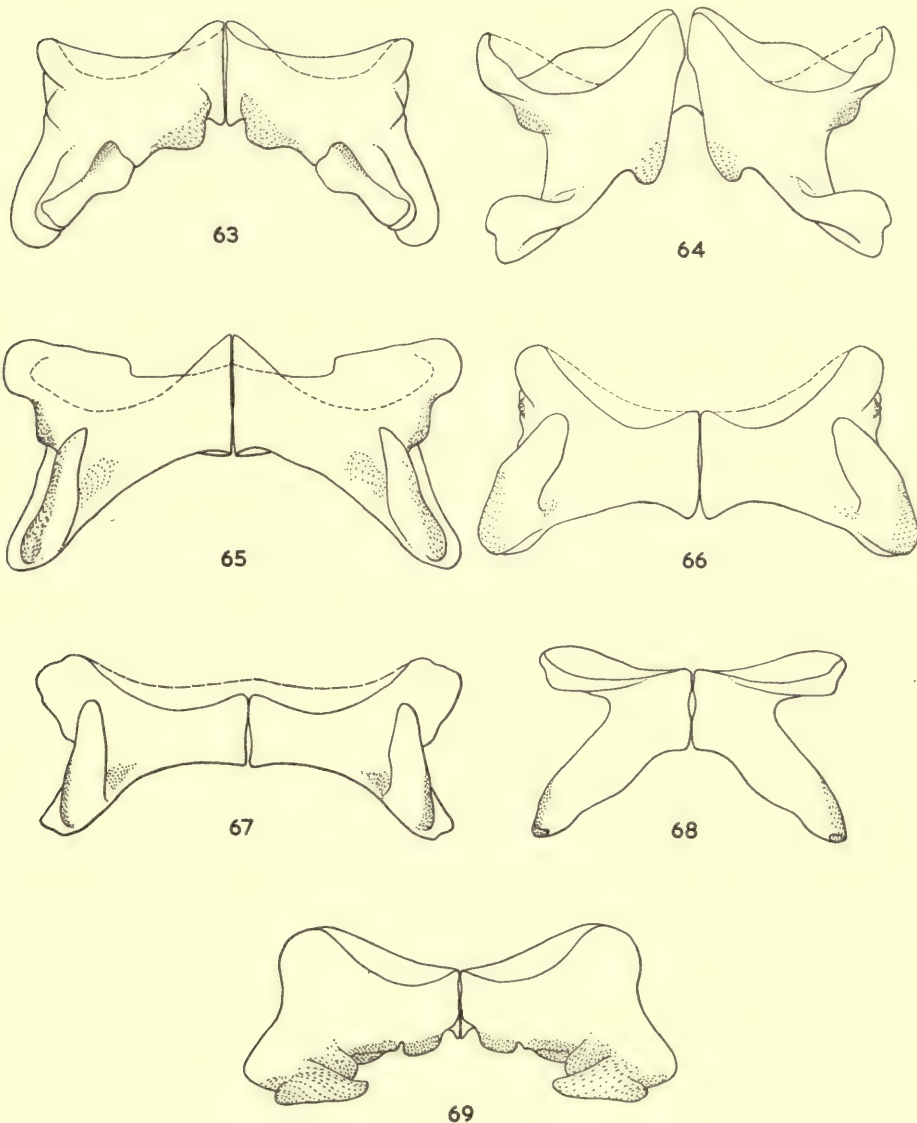
Pterotiltus femoratus Ramme, 1929 : 314, figs 34d, 35c. Holotype ♂, CAMEROUN (BMNH) [examined].

***P. berlandti* Ramme**

Pterotiltus berlandti Ramme, 1929 : 316. Holotype ♂, ZAIRE (? MNHN, Paris or MRAC, Tervuren).

***P. giorgii* Ramme**

Pterotiltus giorgii Ramme, 1929 : 317. Holotype ♀, ZAIRE (MRAC, Tervuren).



FIGS 63-69. *Pterotiltus* species, male epiphalli. 63, *P. apicalis* I. Bolívar; 64, *P. impennis* (Karsch); 65, *P. miniatulus* Karsch; 66 *P. occipitalis* Ramme; 67, *P. inuncatus* (Karsch); 68, *P. minimus* Ramme; 69, *Pterotiltus* sp., Uganda.

***P. occipitalis* Ramme**

Pterotiltus occipitalis Ramme, 1929 : 317. Holotype ♀, CAMEROUN (MNHU, Berlin) [examined].

***P. minimus* Ramme**

Pterotiltus minimus Ramme, 1929 : 318, fig. 36. Holotype ♂, CAMEROUN (MNHU, Berlin) [examined].

DISCUSSION. Species of this genus are forest-living and seem to represent the culmination of adaptation to forest life in the Oxyinae. The wings are completely reduced, many of the species have adopted aposematic coloration, the hind tibiae are cylindrical and have lost all trace of flattening or expansion, and the ovipositor valves have become smooth and obviously adapted to specialised oviposition sites.

Because of this high degree of specialisation the affinities of *Pterotiltus* are obscure, but the epiphallus resembles that of *Cylindrotiltus* and *Cercina* most closely.

***Oxyina* gen. n.**

(Text-figs 45-47)

Type-species: *Oxya bidentata* Willemse, 1925.

DIAGNOSIS. In external appearance very similar to *Oxya*. Differs in that male epiphallus is broad, plate-like, bears strongly developed ancorae and the ectophallic membrane is thickened anteriorly between the halves of the bridge.

DISTRIBUTION. Afghanistan, Iran, Pakistan, E. China, Java.

SPECIES INCLUDED

***Oxyina bidentata* (Willemse) comb. n.**

Oxya bidentata Willemse, 1925b : 24, figs 16, 17. Holotype ♂, PAKISTAN (BMNH) [examined].

***O. javana* (Willemse) comb. n.**

Oxya javana Willemse, 1956 : 148, fig. 87, pl. 1. Holotype ♀, JAVA (RNH, Leiden) [examined].

***O. sinobidentata* (Hollis) comb. n.**

Oxya sinobidentata Hollis, 1971 : 330, figs 228-233, 245. Holotype ♂, CHINA (BMNH) [examined].

DISCUSSION. Superficially this genus closely resembles *Oxya* but the male epiphallus is so distinct it is doubtful that the two genera have a common origin and their similarity is probably a result of convergence. In fact the epiphallus in *Oxyina* is distinct from all other Oxyinae and is similar to that of *Hieroglyphodes* (see Mason, 1973), a genus currently placed in the Hemiacridinae. However, *Oxyina* has more features common to the Oxyinae than to the Hemiacridinae and is placed in the former subfamily.

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(HYMENOPTERA : FORMICIDAE)
IN THE ETHIOPIAN REGION
WITH A REVIEW OF THE MALAGASY SPECIES

B. BOLTON

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A REVISION OF THE ANT GENUS *LEPTOGENYS*
ROGER (HYMENOPTERA : FORMICIDAE)
IN THE ETHIOPIAN REGION
WITH A REVIEW OF THE MALAGASY SPECIES



BY
BARRY BOLTON

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SYNOPSIS

The ant genus *Leptogenys* is revised for the Ethiopian Region and the species of the Malagasy Region are reviewed. Separate species-lists and keys for the two regions are given. Seventy species (56 Ethiopian, 14 Malagasy) are recognized, of which 26 are new. Twenty-five new

synonyms, mostly infraspecific, are established. No subgenera are recognized. The Madagascan species *jonesii* (Forel), known only from the male, is transferred to the genus *Pachycondyla* F. Smith.

INTRODUCTION

THE genus *Leptogenys* comprises a reasonably compact and large genus within the tribe Ponerini. It was originally placed in a tribe of its own, along with *Prionogenys* Emery but as Brown (1963) pointed out, the traditional characters for separating a tribe Leptogenyini as independent are insufficient. At present there are some 280 named forms within the genus (including synonyms, etc.), which may represent about 175 valid species. Of these the Ethiopian and Malagasy regions have 56 and 14 species respectively, a total of 70 species or about 40 per cent of the world total.

The genus is distributed throughout the world's tropics and a few species occur in the subtropical zones. Wheeler (1922) gave a map of the distribution of the genus which has not radically altered since that time. Previous revisionary studies of the genus do not exist for the species of the Ethiopian and Malagasy regions although Arnold (1915) presented a key to the South African species and later gave additional notes and comments on a number of forms (Arnold, 1926).

Very little is known of the biology of the species. Nest sites are usually in the ground, in rotten wood or in compressed leaf litter (Bolton, 1973) although a few subarborescent species are now known which nest in dead wood at some distance above the ground and forage upon the tree-trunks. In other zoogeographical regions some species are semi-nomadic, without a fixed nest-site, but it is not known if this applies to any species from the regions under consideration at present. Food records are few, the species for which prey has been recorded show that the main diet is either of termites or terrestrial Isopoda. Many species are nocturnal and are only rarely to be found during daylight by normal collecting methods.

In the vast majority of species only the worker caste has been described. Females (queens) of only a few species are known and the males are virtually all unknown as collections of this caste in association with workers are extremely rare. The known males are all normal, winged forms but the females are apterous and in the main very ergatoid.

Most species are more or less restricted in distribution but a number of them, particularly some members of the *maxillosa*-group, are well-known tramp species, having been spread throughout the tropics by human commerce (Wilson & Taylor, 1967).

ABBREVIATIONS OF MUSEUMS

AMNH, New York	The American Museum of Natural History, New York, U.S.A.
BMNH	British Museum (Natural History), London, U.K.
IE, Naples	Istituto di Entomologia, Naples, Italy.
MCSN, Genoa	Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy.
MCZ, Cambridge	Museum of Comparative Zoology, Cambridge, Mass., U.S.A.
MHN, Geneva	Muséum d'Histoire Naturelle, Geneva, Switzerland.
MNHN, Paris	Muséum National d'Histoire Naturelle, Paris, France.

MNHU, Berlin	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany (D.D.R.).
MRAC, Tervuren	Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
NM, Basle	Naturhistorisches Museum, Basle, Switzerland.
NM, Bulawayo	National Museum, Bulawayo, Rhodesia.
NM, Vienna	Naturhistorisches Museum, Vienna, Austria.
SAM, Cape Town	South African Museum, Cape Town, South Africa.
UFC, Yaounde	Université Fédéral du Cameroun, Yaounde, Cameroun.
UM, Oxford	University Museum, Oxford, U.K.

MEASUREMENTS AND INDICES

Total Length (TL). The total outstretched length of the individual, from the mandibular apex to the gastral apex.

Head Length (HL). The straight-line length of the head in perfect full-face view, measured from the mid-point of the anterior clypeal margin to the mid-point of the occipital margin.

Head Width (HW). The maximum width of the head measured behind the eyes in full-face view.

Cephalic Index (CI). $\frac{HW \times 100}{HL}$

Scape Length (SL). The straight-line length of the antennal scape, excluding the basal constriction or neck.

Scape Index (SI). $\frac{SL \times 100}{HW}$

Pronotal Width (PW). The maximum width of the pronotum measured in dorsal view.

Petiole Height (PH). The height of the petiole measured in profile from the apex of the ventral (subpetiolar) process vertically to a line intersecting the dorsalmost point of the node.

Petiole Length (PL). The length of the petiole from the anterior process to the posteriormost point of the tergite, where it surrounds the gastral articulation.

Lateral Petiole Index (LPI). $\frac{PH \times 100}{PL}$

Dorsal Petiole Width (DPW). The maximum width of the petiole in dorsal view.

Dorsal Petiole Index (DPI). $\frac{DPW \times 100}{PL}$

All measurements are expressed in millimetres.

DEFINITION OF THE GENUS

LEPTOGENYS Roger

Leptogenys Roger, 1861 : 41. Type-species: *Leptogenys falcigera* Roger, 1861 : 42; by subsequent designation of Bingham, 1903 : 52.

- Lobopelta* Mayr, 1862 : 733. Type-species: *Ponera diminuta* F. Smith, 1857 : 69; by subsequent designation of Bingham, 1903 : 54. **Syn. n.**
- Lobopelta* Mayr [as subgenus of *Leptogenys*]; Emery, 1911 : 101, et auctt.
- Machaerogenys* Emery, 1911 : 100 [subgenus of *Leptogenys*]. Type-species: *Leptogenys truncatirostris* Forel, 1897 : 195; by original designation. **Syn. n.**
- Dorylozelus* Forel, 1915b : 24. Type-species: *Dorylozelus mjobergi* Forel, 1915b : 25; by monotypy (= *Leptogenys tricola* Taylor, 1969 : 132, substitute name for *D. mjobergi* due to secondary homonymy in *Leptogenys*). [Synonymy by Taylor, 1969 : 132.]
- Microbolbos* Donisthorpe, 1948 : 170. Type-species: *Microbolbos testaceus* Donisthorpe, 1948 : 170; by original designation. [Synonymy by Wilson, 1955 : 136.]

The synonymy of *Lobopelta* and *Machaerogenys* has been derived independently by Prof. W. L. Brown and will be recorded by him in his forthcoming revision of genera of tribe Ponerini.

Worker. Minute to large monomorphic ants belonging to the tribe Ponerini.

Mandibles variously shaped, may be subtriangular, short linear, or strongly elongate so that they are incapable of closing against the clypeus, but in all cases they are edentate or nearly so. Maximum number of teeth in species of Ethiopian and Malagasy Regions is three, consisting of apical plus two preapical; more usually only with one preapical or entirely without preapical teeth. Median portion of clypeus usually projecting as a distinct lobe, with a longitudinal median carina (absent only in *truncatirostris*). Palp formula 4,4. Lobes of frontal carinae small, only partially covering the antennal insertions, the major portion of which is visible in dorsal view. Antennae 12-segmented, the antennal scapes usually long, SI > 100, very rarely shorter. Eyes present in all known species, varying from very large to minute. Dorsal alitrunk with promesonotal suture well developed; metanotal groove present, usually distinct, reduced or indistinct only in some minute species. Middle and hind tibiae each with a large pectinate spur and a smaller simple spur. Pretarsal claws distinctly pectinate in most species, the pectination reduced to two, three or four teeth in some, very rarely absent in some minute species. Petiole a node of varying configuration, very rarely a thick, tapering scale (*spandax*). Gaster usually constricted between first and second segments, the constriction very faint or absent in some cases (*stuhlmanni*-group, *guineensis*-group). Sting long and stout.

Female. Usually ergatoid and with the same characters as the workers, but with the gaster larger. In one species (*ergatogyna*) the female is apterous but not ergatoid, with a complete set of thoracic sclerites and a full complement of sutures. Ocelli are present in this species but not in the other known females.

Male. Known only for a few species. Mandibles reduced, partially or wholly concealed by the broad clypeus when closed. Palp formula 6,4 (apparently 5,4 in some). Antennae 13-segmented, the scape short, at most about as long as the second funicular segment, often shorter. Eyes large, ocelli well developed. Lobes of frontal carinae widely separated, small, not concealing the antennal insertions. Mesoscutum with notauli and parapsidal furrows present; in profile this sclerite usually not swollen, not overhanging the pronotum in front. Hind wings without an anal lobe. Middle and hind tibiae with one large pectinate and one small simple spur. Pretarsal claws pectinate in all known species. Pygidium not projecting into a curved spine posteriorly.

NOTES ON THE GENUS

THE SYNONYMY OF *Leptogenys*.

Of the four names listed above as synonyms of *Leptogenys* two were previously recorded. The first of these, *Dorylozelus*, need not concern us here as it applies to an Australian species, and is fully documented by Taylor (1969). *Microbolbos* was a name erected by Donisthorpe (1948) to cover a single West African species

now known to be closely related to *guineensis*. Leaning heavily on the traditional characters used to define *Leptogenys*, Donisthorpe noted that in his species the claws were not pectinate and the mandible had three teeth (apical plus two preapical). Other small species are now known in which pectination is lost and a more or less complete series from fully to not pectinate can be constructed. Within the *guineensis*-group itself both *microps* and *testacea* lack pectination whilst *guineensis* has usually two minute teeth at least on the hind claws, and *spandax* has complete pectination. A similar phenomenon may be observed among the smaller species of the *nitida*-group. As pointed out by Wilson (1955), who synonymized *Microbolbos* to *Leptogenys*, the presence of an 'extra' preapical tooth is scarcely a useful character as in a number of species of the Oriental and Indo-Australian regions numerous preapical teeth are developed (*processionalis*-group).

The two names newly synonymized above were originally separated from *Leptogenys* on mandibular structure. *Lobopelta* was erected by Mayr (1862) at a time when only very few species were known of *Leptogenys*, and all placed therein had elongate, linear mandibles. Recognizing that the two were closely related, Mayr defined *Lobopelta* as the short mandibulate forms, *Leptogenys* as the long mandibulate species. The two were retained as separate genera by a number of authors (e.g. Bingham, 1903) but as more species were described it became apparent that the distinction was by no means as sharp as was at first thought, and eventually Emery (1911) reduced *Lobopelta* to subgenus of *Leptogenys*. Since that time other species have been described which cannot easily be placed in either subgenus as their mandibles are intermediate in form, and in the present paper the thirteen species of the *sulcinoda*-group show a series in which the mandibles become more elongate and the median lobe of the clypeus becomes shorter and narrower. The result is that at one end of the group are species in which the mandibles close tightly against the clypeus, and at the other end are forms which have a large gap between clypeus and mandibles when the latter are closed. Thus one has the strange situation of having both subgenera within the same species-group.

That the process of mandibular variation is not necessarily unidirectional is possibly illustrated by *zapyxis* of the *stuhlmanni*-group. In all other species of this group the mandibles are long and quite narrow. In *zapyxis*, however, a convex lamelliform extension has developed which runs most of the length of the inner mandibular margin and is, in effect, on its way back to a secondary short mandibulate condition as, if this lamella becomes much larger, then the mandibles will meet along their length when closed and will close against the clypeus although still projecting far in front of it.

In view of these facts it was decided that *Lobopelta* was not viable even as a subgenus and consequently it has been placed in the synonymy.

In the case of the final name, subgenus *Machaerogenys*, I cannot comprehend why a separate subgenus was ever thought necessary for *truncatirostris* and its allies. Emery's (1911) original description of the subgenus was based only on the mandibular structure of *truncatirostris* itself, which is admittedly very derivative. However, this diagnosis does not apply to the other two species usually placed here, *arcistrostris* and *ridens*, which have more normal mandibles and hence must be removed from

Machaerogenys although sharing many other characters with *truncatirostris* (and showing a number of resemblances to the *maxillosa*-group). It is my opinion that a separate subgenus is unnecessary to contain a single species merely because its mandibles are more specialized than those of its closest relatives, and *Machaerogenys* has been abandoned.

FEMALES OF THE SPECIES.

Of the 56 species presently known from the Ethiopian Region, females are known for only six or seven, and all these except one are extremely ergatoid with the alitrunk and head similar to that of the worker. Ocelli and the thoracic sutures usually associated with this caste are absent. However, the female may be determined as the gaster is considerably more bulky than in the worker and the node of the petiole is usually antero-posteriorly compressed and considerably broader in dorsal view than in workers of the same species.

The queen of *ergatogyna* is the only female yet known from the genus in which flight sclerites and ocelli are distinct and well developed, although the queen of this species appears never to develop wings, and again bears a remarkable similarity to the worker caste.

MANDIBULAR STRUCTURES.

Regardless of the shape or length of mandible in individuals, many species of the Ethiopian Region have a mandibular groove which has its origin dorsolaterally at the extreme base of the blade. It runs diagonally to the outer margin of the mandible and continues down the ventral surface. In some species this groove takes the form of a broad channel (*attenuata*) whilst in others it is quite small (*furtiva*). In other species it may be reduced, vestigial or absent (*mactans*, *guineensis*-group), but it is particularly marked in members of the *stuhlmanni*-group.

In species in which this groove is present there is an apparently associated thin-spot or membranous area on the dorsal surface of the mandible, close to the base of the groove and on its inner side (towards the inner margin of the mandible). In the long mandibulate species the thin-spot is usually visible even when the mandibles are closed, but in others the spot is usually concealed by the leading edge of the clypeus unless the mandibles are open.

The function of these structures is not known, nor can any reason be suggested for their absence in some species.

SPECIES OF THE ETHIOPIAN REGION

LIST OF SPECIES

conradti-group

conradti Forel

crustosa Santschi

conradti var. *rufipes* Santschi **syn. n.**

africanus Weber **syn. n.**

maxillosa-group**falcigera** Roger*insularis* F. Smith**jeanneli** Santschi**maxillosa** (F. Smith)*falcata* Roger*vinsonnella* (Dufour) **syn. n.***cribrata* Emery (provisional synonym)**pavesii** Emery*maxillosa* subsp. *sericea* Weber **syn. n.****stuhlmanni-group****camerunensis** Stitz*stuhlmanni* race *camerunensis* var. *angusticeps* Forel [unavailable]*stuhlmanni* subsp. *camerunensis* var. *opalescens* Wheeler [unavailable]**erythraea** Emery **stat. n.****leiothorax** Prins **stat. n.****nebra** sp. n.**regis** sp. n.**schwabi** Forel**sterops** sp. n.**stuhlmanni** Mayr*comorensis* Forel **syn. n.****titan** sp. n.**vindicis** sp. n.**zapyxis** sp. n.**sulcinoda-group****bellii** Emery**elegans** sp. n.**excellens** sp. n.**ferrarii** Forel*ferrarii* st. *dentatula* Santschi **syn. n.****longiceps** Santschi**mastax** sp. n.**nuserra** sp. n.**occidentalis** Bernard **stat. n.***ferrarii* subsp. *sulcinodis* Bernard **syn. n.***ferrarii* subsp. *bernardi* Baroni Urbani **syn. n.****princeps** sp. n.**ravida** sp. n.**sulcinoda** (André)**terrioni** sp. n.**trilobata** Santschi**attenuata-group****attenuata** (F. Smith)*jaegerskjoeldi* Santschi**bubastis** sp. n.**crassinoda** Arnold **stat. n.****ergatogyna** Wheeler*cursor* Arnold **syn. n.****guineensis-group****guineensis** Santschi**microps** sp. n.**spandax** sp. n.**testacea** (Donisthorpe)

havilandi-group**arnoldi** Forel**furtiva** Arnold stat. n.**havilandi** Forel**peringueyi** Forel**nitida**-group**amon** sp. n.**ankhesa** sp. n.**buyssoni** Forel**castanea** (Mayr)*parva* Forel syn. n.*parva* var. *bellua* Forel syn. n.*parva* var. *dispar* Santschi syn. n.*hewitti* Santschi syn. n.**cryptica** sp. n.**diatra** sp. n.**honorio** sp. n.**khaura** sp. n.**mactans** sp. n.**nitida** (F. Smith)*intermedia* Emery syn. n.*tenuis* Stitz*nitida* var. *adpressa* Forel syn. n.*nitida* var. *aena* Forel syn. n.*nitida* var. *gracilis* Santschi syn. n.*nitida* st. *insinuata* Santschi syn. n.*nitida* var. *grandior* Forel syn. n.*nitida* race *brevinodis* Forel syn. n.*nitida* st. *speculans* Santschi syn. n.*brevinodis* var. *deflocata* Santschi syn. n.*nitida* var. *capensis* Baroni Urbani syn. n.**piroskae** Forel**strator** sp. n.**striatidens** sp. n.**stygia** sp. n.

Note. A number of the synonyms given above in *nitida* and *maxillosa*-groups have also been determined independently by Prof. W. L. Brown and will be recorded by him in his forthcoming revision of the genera of tribe Ponerini.

KEY TO SPECIES

(Workers)

- 1 With petiole in profile the posterodorsal angle projecting as a spine or tooth (Text-fig. 24) 2
- With petiole in profile the posterodorsal angle not projecting as a spine or tooth 3
- 2 Rugosity of head and alitrunk overlaid by a dense puncturation. Scapes, legs, and at least the first gastral tergite reticulate and dull. (Guinea, Gabon, Cameroun, Zaire, Sudan **crustosa** (p. 251)
- Rugosity of head and alitrunk not overlaid by puncturation. Scapes and legs usually shiny, not reticulate; first gastral tergite highly polished. (Ivory Coast, Ghana, Cameroun) **conradti** (p. 250)

- 3 Entirety of head, alitrunk and gaster densely shagreened and opaque, with scattered larger punctures and short, dense, greyish, pruinose pubescence 4
- Not entirely shagreened, usually not opaque, at least the gaster usually shining. If finely and densely reticulate-punctate everywhere then scattered larger punctures absent and dense pruinose pubescence lacking 7
- 4 Dorsum of head, alitrunk and first two gastral tergites with numerous standing hairs. Larger species, HL > 1.75. (Tanzania) *jeanneli* (p. 253)
- Dorsum of head, alitrunk and first two gastral tergites without standing hairs. Smaller species, HL < 1.75 5
- 5 Fringing lamella of clypeus broad and broadly rounded. Outer margin of mandible straight or concave in its distal half (Text-fig. 1). Sides of head not strongly divergent anteriorly in full-face view. (Somalia, Sudan, Cameroun, Kenya, Tanzania; tramp species in Old World tropics) *pavesii* (p. 255)
- Fringing lamella of clypeus narrow, either narrowly rounded or obtusely angulate medially. Outer margin of mandible convex throughout its length (Text-fig. 2). Sides of head divergent anteriorly in full-face view 6
- 6 Node of petiole in dorsal view distinctly broader than long, DPI > 105. (Zaire, Rhodesia, S.W. Africa; pantropical tramp species) *maxillosa* (p. 254)
- Node of petiole in dorsal view at least as long as broad, usually distinctly longer than broad, DPI 100 or less (pantropical tramp species) *falcigera* (p. 252)
- 7 First and second gastral tergites without hairs, with sparse, strongly adpressed pubescence. Eyes minute, their maximum diameter less than the maximum width of the scape. Gaster very weakly or not constricted between the first and second segments 8
- First and second gastral tergites with hairs, often also with pubescence. If gastral hairs sparse then either eyes larger, their maximum diameter greater than the maximum width of the scape, or gaster strongly constricted between first and second segments, or both 11
- 8 Pronotal dorsum with a pair of long, erect hairs anteriorly, much longer than the remaining pilosity. Minute species, HL < 0.70, PW < 0.42, with minute eyes, diameter < 0.05. (Ivory Coast) *microps* (p. 278)
- Pronotal dorsum without a pair of long, erect hairs anteriorly, pilosity absent or hairs of approximately equal length. Larger species, HL > 0.75, PW > 0.45, with larger eyes, diameter > 0.07 9
- 9 Pronotal dorsum without short, standing hairs. Petiole in profile a thick scale, tapering dorsally (Text-fig. 28). Larger species with relatively longer antennal scapes, HL > 1.25, SI > 140. (Ghana) *spandax* (p. 279)
- Pronotal dorsum with numerous short, standing hairs. Petiole in profile not a thick scale but a high, narrow node. Smaller species with relatively shorter scapes, HL < 1.10, SI < 130 10
- 10 Apex of mandible with three teeth, apical plus two preapical (Text-fig. 23). (Ghana) *testacea* (p. 280)
- Apex of mandible with two teeth, apical plus one preapical. (Guinea, Ghana) *guineensis* (p. 278)
- 11 Petiole in profile or in dorsal view with the upper halves of the sides longitudinally rugose or sulcate 12
- Petiole in profile or in dorsal view with the upper halves of the sides not longitudinally rugose or sulcate 15
- 12 Pronotal dorsum unsculptured apart from pits from which hairs arise 13
- Pronotal dorsum sculptured, at least anteriorly 14
- 13 In full-face view the occipital margin of the head feebly convex (Text-fig. 14). Petiole node in profile longer, LPI < 140. (Gabon). *sulcinoda* (p. 272)
- In full-face view the occipital margin of the head broadly concave (Text-fig. 13). Petiole node in profile shorter, LPI > 145. (Guinea) *occidentalis* (p. 270)

- 14 Larger species, HL > 1.00, PW > 0.58, with relatively longer head and scapes, CI < 65, SI > 140. (Ivory Coast, Ghana) **mastax** (p. 268)
 - Smaller species, HL < 1.00, PW < 0.58, with relatively shorter head and scapes, CI > 65, SI < 135. (Ivory Coast, Ghana) **nuserra** (p. 269)
- 15 Mandibles extended into elongate, narrow, linear or sublinear blades, the inner margins of which are often concave. Mandibles not capable of closing tightly against the median lobe of the clypeus, which is often reduced, enclosing a space (sometimes large) between themselves and the clypeus (Text-figs 7-11) 16
 - Mandibles short and usually quite stout, their inner margins usually distinctly convex. Mandibles capable of closing tightly against the median lobe of the clypeus, never enclosing a space between themselves and the clypeus (Text-figs 13-18) 35
- 16 Antennal scapes with SL > 1.90. Gaster very weakly or not constricted between the first and second segments. Metanotal groove not cross-ribbed or sculptured 17
 - Antennal scapes with SL < 1.70. Gaster distinctly constricted between first and second segments. Metanotal groove distinctly cross-ribbed or otherwise sculptured 27
- 17 With head in full-face view eyes not breaking the outline of the sides of the head (Text-fig. 8). Antennal scapes with dense pubescence but without erect hairs which are as long as the maximum width of the scape. Large species with relatively short scapes, HL > 2.10, SI < 170. 18
 - With head in full-face view eyes breaking the outline of the sides of the head (Text-figs 4, 7). Antennal scapes with numerous erect hairs which are as long as or longer than the maximum width of the scape; pubescence on scapes usually sparse. Smaller species with relatively long scapes, HL < 2.10, SI > 180 19
- 18 Dorsum of pronotum and propodeum unsculptured apart from pits from which hairs arise. Maximum diameter of eye about 0.66. (Cameroun) **titan** (p. 263)
 - Dorsum of pronotum and propodeum, especially the latter, sculptured. Maximum diameter of eye about 0.50. (Kenya, Tanzania) **regis** (p. 259)
- 19 Entire dorsum of alitrunk completely unsculptured. Sides of alitrunk unsculptured apart from cross-ribbing at meso-metapleural suture and a few rugae around the bulla of the metapleural gland. Full adult colour brown or deep red-brown, with bluish or violet opalescence, which may be patchy 20
 - Propodeal dorsum at least weakly, usually strongly sculptured; pronotum sometimes sculptured, often not. Sides of alitrunk with plurae and propodeum striate or rugose. Full adult colour black or brown but without opalescence 21
- 20 Larger species with antennal scapes both absolutely and relatively longer, SL > 2.75, SI > 230. (Cameroun, Zaire) **camerunensis** (p. 256)
 - Smaller species with antennal scapes both absolutely and relatively shorter, SL < 2.60, SI < 220. (Mozambique) **leiothorax** (p. 258)
- 21 Inner margin of mandible with a convex, semi-translucent lamella (Text-fig. 21). (Ghana) **zapyxis** (p. 264)
 - Inner margin of mandible without a convex, semi-translucent lamella (Text-figs 6, 20) 22
- 22 Antennal scapes relatively shorter, SI < 200 23
 - Antennal scapes relatively longer, SI > 200 24
- 23 Larger species, HL > 1.80, with maximum diameter of eye 0.50 or more. Pronotal dorsum weakly sculptured. With mandibular apices overlapping the basal portion of each blade passing through a curve before its junction with the clypeus. (Sudan, Kenya, Mozambique, Comoro Islands) **stuhlmanni** (p. 261)
 - Smaller species, HL < 1.60, with maximum diameter of eye < 0.45 (ca 0.40). Pronotal dorsum unsculptured apart from minute hair-pits. With mandibular apices overlapping the basal portion of each blade not passing through a curve before its junction with the clypeus. (Ivory Coast) **sterops** (p. 261)
- 24 Dorsum of head unsculptured apart from minute hair-pits: pronotal dorsum usually the same but rarely with some faint sculpturation. 25

- Dorsum of head and pronotum distinctly sculptured everywhere. (Cameroun) *vindicis* (p. 263)
- 25 Larger species with very large eyes, HL > 1.90, maximum diameter of eye 0.54 or more. Full adult colour brown. (Ethiopia) *erythraea* (p. 257)
- Smaller species with smaller eyes, HL < 1.85, maximum diameter of eye 0.48 or less. Full adult colour black 26
- 26 Eyes larger, maximum diameter in the range 0.44-0.48 (in HW range of 1.08-1.22). Width of head across eyes the same as or only slightly less than the width across the clypeus from corner to corner. (Rhodesia, South Africa) *schwabi* (p. 259)
- Eyes smaller, maximum diameter about 0.36 (with HW ca 1.22). Width of head across eyes much less than width across the clypeus from corner to corner. (Cameroun) *nebra* (p. 258)
- 27 Dorsum of head finely rugose or reticulate-rugose, the interrugal spaces with numerous fine punctures 28
- Dorsum of head not rugose nor reticulate-rugose; either punctate, reticulate-punctate or smooth and shining 29
- 28 Pronotum with a fine and very dense reticulation which covers the entire dorsum, also with scattered hair-pits. Larger species, HL > 1.30, SL > 1.40, SI > 125. (Cameroun) *terroni* (p. 273)
- Pronotum without a fine reticulation, at most with a few weak, rounded rugulae. Smaller species, HL < 1.20, SL < 1.20, SI < 120. (Cameroun, Zaire) *trilobata* (p. 273)
- 29 Sides of head below and behind eyes and lateral portions of ventral surface of head strongly sculptured. (Zaire) *excellens* (p. 266)
- Sides of head below and behind eyes and lateral portions of ventral surface of head unsculptured except for hair-pits and very rarely some weak, superficial reticulation 30
- 30 Dorsum of head coarsely and closely reticulate-punctate, the punctures not separated by smooth areas. Larger species, HL > 1.20, PW > 0.75. Node of petiole massive, PL > 0.60, PH > 0.75. *princeps* (p. 271)
- Dorsum of head with scattered punctures which are separated by smooth areas. Smaller species, HL < 1.15, PW < 0.70. Node of petiole smaller, PL < 0.55, PH < 0.70 31
- 31 Mesopleuron completely reticulate-punctate, with numerous transverse rugulae. Petiole dorsum and upper halves of sides reticulate-punctate superimposed upon a coarser rugulation. (Senegal, Ghana) *longiceps* (p. 268)
- Mesopleuron not reticulate-punctate; a few punctures and transverse rugulae may be present but there are extensive unsculptured areas. Petiole dorsum and sides not reticulate-punctate 32
- 32 Middle of posterodorsal margin of petiole slightly projecting as an obtuse tubercle. (Ethiopia) *bellii* (p. 265)
- Middle of posterodorsal margin of petiole not projecting as a tubercle 33
- 33 Eyes smaller, their maximum diameter approximately equal to the length of the third funicular segment (Text-fig. 10). Head black, very polished, with only a few scattered, minute punctures. (Zaire) *ravida* (p. 272)
- Eyes larger, their maximum diameter markedly greater than the length of the third funicular segment (Text-fig. 9). Head brown or black, if black then with numerous quite distinct punctures 34
- 34 Larger species, HL > 0.95, SL > 0.85, with longer petiole, LPI < 140. Full adult colour black. (Ivory Coast, Ghana, Nigeria, Cameroun) *elegans* (p. 265)
- Smaller species, HL < 0.90, SL < 0.85, with shorter petiole, LPI > 140. Full adult colour brown. (Zaire, Rhodesia) *ferrarii* (p. 267)

- 35 Propodeal dorsum with a longitudinal groove medially, and anteriorly with a broad, transverse impression posterior to the metanotal groove. Mandibles very broad, massively developed (Text-fig. 22). Antennal scapes relatively very long, SI > 220. (Ghana, Uganda, Cameroun, Zaire) . . . *ergatogyna* (p. 276)
- Propodeal dorsum without a median groove and transverse impression anteriorly. Mandibles not as above. Antennal scapes shorter, SI < 200 . . . 36
- 36 Dorsum of head coarsely reticulate-punctate or very densely punctulate over most or all of its surface . . . 37
- Dorsum of head either smooth and shining, with only scattered punctures from which hairs arise, or rarely superficially finely reticulate . . . 43
- 37 Minute species, HL < 0.85, PW < 0.50. Eyes small or minute, their maximum diameter much less than the maximum width of the scape. Second funicular segment at most as long as third, usually much shorter than third . . . 38
- Larger species, HL > 1.10, PW > 0.65. Eyes large, their maximum diameter greater than the maximum width of the scape. Second funicular segment distinctly longer than the third . . . 40
- 38 Pronotal dorsum unsculptured, smooth and shining. (Nigeria) . . . *khaura* (p. 288)
- Pronotal dorsum strongly sculptured . . . 39
- 39 Antennal scapes longer, SI 119 or more. Eyes larger, with more than 10 facets. Full adult colour black. (Nigeria, Cameroun) . . . *stygia* (p. 292)
- Antennal scapes shorter, SI 115 or less. Eyes smaller, with less than 10 facets. Full adult colour yellow-brown. (Ghana) . . . *cryptica* (p. 286)
- 40 First and second gastral tergites covered with a fine, dense, reticulate-punctuation or granulation, without smooth, shining areas. (Rhodesia) . . . *furtiva* (p. 281)
- First and second gastral tergites unsculptured, smooth and shining apart from pits from which hairs arise . . . 41
- 41 Pronotal dorsum with scattered small pits separated by smooth areas, without a fine blanketing sculpture on any part of the sclerite. (South Africa) *peringueyi* (p. 282)
- Pronotal dorsum with a fine, dense sculpturation, blanketing the sclerite at least in part . . . 42
- 42 Fringing lamella of clypeus narrow and indistinct. Antennal scapes relatively short, SI < 140. Eyes large, maximum diameter 0.34 or more. (Rhodesia) *arnoldi* (p. 281)
- Fringing lamella of clypeus broad and distinct, usually opaque. Antennal scapes relatively long, SI > 140. Eyes smaller, maximum diameter 0.30 or less. (South Africa). . . *havilandi* (p. 282)
- 43 Ventral process of petiole complex, double, consisting of a large lobe or tooth antero-ventrally and a smaller lobe or tooth situated more posteriorly, the two separated by a distinct space or indentation (Text-fig. 25) . . . 44
- Ventral process of petiole simple, single, consisting only of a lobe or tooth antero-ventrally, of varying configuration . . . 46
- 44 Sides and ventral surface of head sculptured. Node of petiole in profile decreasing slightly in thickness from base to apex. (Zaire) . . . *strator* (p. 291)
- Sides and ventral surface of head not sculptured. Node of petiole in profile increasing slightly in thickness from base to apex . . . 45
- 45 Pronotal dorsum with numerous shallow, foveolate impressions separated by smooth areas. Smaller species, SL < 1.10, with relatively shorter antennal scapes, SI < 135. (Cameroun) . . . *honorio* (p. 287)
- Pronotal dorsum smooth, without foveolate impressions. Larger species, SL > 1.10, with relatively longer antennal scapes, SI > 135. (Zaire) *ankhesa* (p. 284)
- 46 Antennal scapes with SL > 1.40 . . . 47
- Antennal scapes with SL < 1.30 . . . 50

- 47 Maximum diameter of eye in full-face view less than maximum width of scape. Ventral process of petiole a broad lobe with a posteroventral tooth. Full adult colour red-brown. (Ethiopia) **buyssoni** (p. 285)
 - Maximum diameter of eye in full-face view greater than maximum width of scape. Ventral process of petiole a simple or acute lobe. Full adult colour black 48
- 48 Larger species with relatively longer head and antennal scapes and larger eyes; HL 1.50 or more, CI < 65, SI > 170, ocular diameter 0.36 or more. Node of petiole in dorsal view very strongly narrowed anteriorly, much broader behind than in front, the sides feebly concave (Text-fig. 29). Head and body usually with bluish opalescence. (South Africa) **attenuata** (p. 274)
 - Smaller species with relatively shorter head and antennal scapes and smaller eyes; HL < 1.45, CI > 65, SI < 165, ocular diameter 0.32 or less. Node of petiole in dorsal view only slightly narrower in front than behind (Text-fig. 30). Head and body shiny black, without bluish opalescence 49
- 49 Mesonotum and propodeum without scattered large pits or punctures. Propodeal dorsum shorter, about 1.10 in profile from metanotal groove to apex of prominence on declivity in workers with HW range 0.96-1.00. (South Africa) **crassinoda** (p. 276)
 - Mesonotum and propodeum with numerous scattered large pits or punctures. Propodeal dorsum longer, about 1.30 in profile from metanotal groove to apex of prominence on declivity in workers with HW range 0.96-1.00. (Cameroun) **bubastis** (p. 275)
- 50 Antennal scapes relatively very short, SI < 95. (South Africa) **mactans** (p. 288)
 - Antennal scapes relatively long, SI 100 or more 51
- 51 Mandibles covered with dense, fine, longitudinal striation. Dorsum of head and pronotum with dense but superficial reticulation. (Cameroun) **striatidens** (p. 292)
 - Mandibles smooth and shining, not striate. Dorsum of head and pronotum smooth, without superficial reticulation 52
- 52 Circumocular impression very broad and deep in front of, above and behind eye, so that the eye appears to be sunk in a concavity in the side of the head (Text-fig. 18). Node of petiole in dorsal view much longer than broad, DPI < 70; head long and narrow, CI < 65. (Cameroun) **amon** (p. 283)
 - Circumocular impression very weak or absent, the eye not sunk into a concavity in the side of the head. Node of petiole much broader, DPI 80 or more; head shorter and broader, CI 69 or more 53
- 53 Antennal scapes both relatively and absolutely shorter, SL < 0.75 (range 0.62-0.70), SI < 120 (range 100-117). (Rhodesia, South Africa) **castanea** (p. 285)
 - Antennal scapes both relatively and absolutely longer, SL > 0.75 (range 0.80-1.08), SI 120 or more (range 120-130) 54
- 54 Smaller species, HL ca 0.86, HW ca 0.62, SL ca 0.80. Ventral process of petiole an elongate, recurved tooth. (Cameroun) **diatra** (p. 287)
 - Larger species, HL > 0.90, HW > 0.65, SL > 0.85. Ventral process of petiole a lobe, the posteroventral angle of which may be dentiform, but not as above 55
- 55 Eyes larger, ocular diameter greater than 0.11, the eyes set well forwards on the sides of the head. The maximum diameter of the eye equal to or greater than the maximum width of the scape in full-face view. (Eastern and southern Africa) **nitida** (p. 289)
 - Eyes small, ocular diameter ca 0.09, the eyes set well back on the sides of the head (Text-fig. 15). The maximum diameter of the eye much less than the maximum width of the scape in full-face view. (Ethiopia) **piroskae** (p. 290)

THE *CONRADTI*-GROUP

Mandibles elongate and linear, curved, not closing tightly against the clypeus. Eyes large, their maximum diameter in full-face view greater than the maximum width of the scape. Second funicular segment elongate, distinctly longer than the third. Head strongly broadened anteriorly, much broader in front than behind. Posterodorsal angle of petiole in profile drawn out into a tooth or spine (Text-fig. 24). Sculpture coarse, rugose upon the head and alitrunk. Gaster constricted between the first and second segments. Clypeus with a prominent median lobe, without a fringing lamella. Standing hairs present on all dorsal surfaces of head and body.

The two species constituting this small group are easily distinguished from their congeners by the characters listed above, the fifth of which is diagnostic. Related species with this character are also known from the Neotropics (*unistimulosa* Roger and its allies). The two species of the Ethiopian Region seem to be confined to forested zones but are widely distributed.

Leptogenys conradti Forel

Leptogenys conradti Forel, 1913b : 666. Syntype workers, CAMEROUN: (*Conradt*) (MHN, Geneva) [examined].

DIAGNOSIS OF WORKER. Posterodorsal angle of petiole in profile drawn out into a spine or tooth. Head and alitrunk rugose, not overlaid by punctures. First gastral tergite smooth and shining.

FURTHER DESCRIPTION. *Worker*. TL 9.4–10.4, HL 1.66–1.76, HW 1.40–1.48, CI 81–85, SL 1.92–2.20, SI 145–155, PW 1.18–1.24, PH 1.10–1.18, PL 0.90–0.96, LPI 117–125, DPW 0.76–0.84, DPI 83–87 (12 measured).

Head considerably broader in front than behind, the occipital border acutely margined and broadly but shallowly concave. Eyes large, maximum diameter ca 0.40–0.44, their greatest diameter in full-face view greater than the maximum width of the scape. Circumocular impression present on inner and posterior margins of eyes. Clypeus with a rounded prominent median lobe. Mandibles elongate, becoming slightly broader from base to apex, most strongly curved near the base and enclosing a large space between them and the clypeus when their apices are overlapping. Second funicular segment long, the respective lengths of segments 1–3 ca 0.26–0.30, 0.44–0.50, 0.36–0.40. Metanotal groove impressed and cross-ribbed. Petiole in profile massive, the posterodorsal angle produced into a tooth which is variously developed amongst individuals but is usually distinctly dentiform. Head, alitrunk and petiole coarsely rugose, the rugae on the head predominantly longitudinal, more sharply developed in some individuals than in others. Gaster unsculptured, smooth and highly polished. Legs and antennae usually shining, but rarely with some fine punctures. Standing hairs abundant upon all surfaces.

This species and *crustosa* are characterized by the projection of the posterior portion of the petiole node into a spine or tooth. They are separable by the characters given in the key and the diagnoses above and also by the fact that *crustosa* averages smaller than *conradti* although this may be found to be incorrect as the species become better known.

A single specimen in the MCZ, Cambridge collection may represent a third species in this group. It resembles *conradti* closely but is smaller, HL 1.38, HW 1.14, (CI 83), SL 1.38, (SI 121), PW 0.96. Note also that the scapes are relatively much shorter. The posterodorsal prominence of the petiole is short and blunt and the clypeus is less acutely carinate than in *conradti*. The sculpture of the cephalic dorsum in

this specimen consists of numerous fine rugulae, not arranged into any pattern or direction.

This specimen may represent a distinct species or may be an extremely aberrant or first-brood specimen of *conradti*, but as only a single worker is available it is not possible at present to decide upon its status. Accordingly I have labelled it '*conradti*?' in the MCZ, Cambridge collection.

MATERIAL EXAMINED.

IVORY COAST: Lamto, Toumodi (*J. Lévieux*); O.R.S.T.O.M. Exp. Sta., Abidjan (*W.L. Brown*). GHANA: Tafo (*B. Bolton*); Bosuso (*D. Leston*); Mt Atewa (*D. Leston*); Legon (*D. Leston*); Sajimasi (*D. Leston*); Aburi (*D. Leston*). CAMEROUN: Ototomo (*G. Terron*); Mbale Mejo to Ekingli (*G. Schwab*).

Leptogenys crustosa Santschi

(Text-fig. 24)

Leptogenys crustosa Santschi, 1914a : 326, fig. 12. Syntype workers, GUINEA: Conakry, 8.viii.1913 (*F. Silvestri*) (IE, Naples).

Leptogenys (Leptogenys) conradti var. *rufipes* Santschi, 1937 : 75. Holotype worker [not female], GABON: Samkita (*F. Faure*) (NM, Basle) [examined]. **Syn. n.**

Leptogenys (Leptogenys) africanus Weber, 1942 : 47, fig. 8. Holotype and paratype workers, SUDAN: Lotti Forest, W. slopes of Imatong Mountains, 5.viii.1939 (*N. A. Weber*) (MCZ, Cambridge) [examined]. **Syn. n.**

DIAGNOSIS OF WORKER. Posterodorsal angle of petiole node in profile drawn out into a blunt spine. Sculpturation of head and alitrunk rugose, overlaid by a fine, dense puncturation. First gastral tergite coarsely reticulate.

FURTHER DESCRIPTION. *Worker.* TL 7.3–9.1, HL 1.34–1.64, HW 1.08–1.38, CI 79–84, SL 1.48–1.90, SI 136–137, PW 0.92–1.20, PH 0.86–1.12, PL 0.74–1.00, LPI 112–116, DPW 0.64–0.86, DPI 86–87 (4 measured).

Head markedly broader in front than behind, in the largest specimen examined width of head in front of eyes at maximum was 1.60, and width across occipital margin 0.96. Eyes large, maximum diameter 0.33–0.46, surrounded on their internal margins by a distinct circumocular impression. Maximum diameter of eye much greater than maximum width of scape. Clypeus with a rounded median lobe. Mandibles elongate and narrow, not closing tightly against the clypeus, enclosing a large gap when their apices are in contact. Mandibular blades most strongly curved basally. Second funicular segment elongate, the respective lengths of segments 1–3 ca 0.30–0.40, 0.34–0.44, 0.28–0.30. Petiole in profile with the posterodorsal angle produced into a short spine. Basic sculpturation of head, alitrunk and petiole a coarse rugosity, predominantly longitudinal upon the head, but everywhere the rugosity is overlaid by a dense puncturation, which is more strongly developed in large than in small individuals. First and second gastral tergites, or at least their basal halves, with a relatively coarse superficial reticulation. This is also present upon the legs and scapes, which are consequently dull. Standing hairs numerous upon all surfaces. Colour black, with the mandibles, antennae and legs red-brown or orange-brown.

MATERIAL EXAMINED.

CAMEROUN: no loc. (*G. Terron*). ZAIRE: Elisabetha (*Tinant*): Ituri, Okondo (*A. Collart*).

THE MAXILLOSA-GROUP

(Text-figs 1, 2, 3, 31)

Mandibles elongate and linear, curved, not closing tightly against the clypeus. Eyes large, their maximum diameter in full-face view greater than the maximum width of the scape. Second funicular segment not, or only very slightly longer than the third. Head slightly or strongly broadened anteriorly, varying among species. Sculpture of a dense shagreening everywhere with scattered larger punctures. Entire body with dense, greyish pruinose pubescence. Gaster constricted between first and second segments. Clypeus without a prominent median lobe; with a fringing lamella.

A further character of value in separating three of the four species of this group (*pavesii*, *maxillosa* and *falcigera*) from all others of the Ethiopian Region except for some members of the *guineensis*-group is that they lack standing hairs on the dorsum of the head, alitrunk, petiole and first two or three gastral tergites. This character also applies to *pruinosa* Forel, an extralimital species of the *maxillosa*-group described from Sri Lanka. Forel (1901b : 81) stated that *pruinosa* was found on wood imported into Hamburg from East Africa and, as I am of the opinion that the *maxillosa*-group is of African origin, I would not be unduly surprised if *pruinosa* were discovered at some time in the future in Kenya or Tanzania.

All species of this group in the Ethiopian region with the exception of the large *jeanneli* are tramp species in the tropical zones of the world and probably rely on human commerce for transportation. To judge from the number of collections examined, *falcigera* has been able to establish itself in some strength in the Hawaiian Islands, whilst *maxillosa* has been recorded from both Cuba and Brazil.

The *maxillosa*-group appears to be related to *truncatirostris* and its allies of the Malagasy Region, but in these species standing hairs are present on the head and body and the mandibles tend to be shorter and broader though linear or sublinear in form.

Leptogenys falcigera Roger

(Text-fig. 2)

Leptogenys falcigera Roger, 1861 : 42. Holotype worker, SRI LANKA (*H. Nietner*) (location of type not known).

Leptogenys insularis F. Smith, 1879 : 675. Syntype workers, HAWAII: Oahu Is. (*T. Blackburn*) (BMNH) [examined]. [Synonymy by Wilson & Taylor, 1967 : 30.]

DIAGNOSIS OF WORKER. Densely shagreened with scattered larger punctures. Without standing hairs. Petiole in dorsal view as long as or longer than broad. Lamelliform margin of clypeus narrow and translucent. Outer margin of mandible convex throughout its length.

FURTHER DESCRIPTION. *Worker*. TL 7.0-7.8, HL 1.40-1.52, HW 1.32-1.46, CI 93-96, SL 1.32-1.48, SI 98-104, PW 0.92-1.02, PH 0.84-0.90, PL 0.66-0.78, LPI 115-127, DPW 0.68-0.70, DPI 90-100 (8 measured).

Head broadened in front of the eyes, the sides weakly convex but diverging anteriorly throughout their length. Eyes large, their maximum diameter ca 0.32-0.38. In full-face view their maximum diameter much greater than the maximum width of the scape. Anterior border of clypeus with a narrow, fringing lamella which is translucent and is narrowly rounded or forms an obtuse angle anteromedially. Mandibles long and linear, their outer margins convex throughout the length of the blade, most strongly convex near the base. Metanotal

groove weak, virtually obliterated. Node of petiole in dorsal view usually longer than broad, more rarely about as long as broad. Entire body densely shagreened and with numerous scattered larger punctures. Pruinosc pubescence present everywhere but standing hairs absent except on the clypeus and gastral apex.

Within this species-group *jeanneli* is easily separated by its possession of standing hairs upon the dorsal surfaces of the head and body, but the other three members form a complex of closely related species which in all likelihood arose in the Ethiopian Region although all three are now widely distributed tramp species; and there is at least one other relative (*pruinosa* Forel) at present unknown in the Ethiopian Region.

Both *falcigera* and *maxillosa* have a relatively narrow clypeal lamella which is translucent and is narrowly rounded or forms an obtuse, rounded angle medially. Also in both these species the outer margin of the mandible is convex throughout its length and the mandibles are long and narrow. The head is strongly broadened anteriorly and the sides are not as convex as in *pavesii*. In *pavesii* the clypeal lamella is broad and broadly and evenly rounded, not forming an angle medially, and is usually opaque. The outer margin of the mandible is convex basally but distal to the convexity is usually flat or concave for part of its length. The mandibular blades themselves are shorter and stouter than in *maxillosa* or *falcigera*. The head is not strongly broadened anteriorly and the sides are more convex in *pavesii*. The separation of *falcigera* from *maxillosa* rests most convincingly upon the shape of the petiole node in dorsal view. In *maxillosa* the node is always distinctly broader than long, with $DPI > 105$, whilst in *falcigera* the node is at most as broad as long, usually distinctly longer than broad, and with a maximum DPI of 100.

In the present study *falcigera* has not been recorded from the mainland of the Ethiopian Region but its range is expected to extend at least into the eastern parts of the continent. It has been previously recorded from Madagascar, Aldabra, Sri Lanka and the Hawaiian Islands.

MATERIAL EXAMINED.

ALDABRA IS.: South Is. (J. G. Frazier). SRI LANKA: Peraden (C. T. Bingham). HAWAII: Wailuku, Maui (R. C. L. Perkins); Hilo (G. Poinar); Honolulu (K. Oshiro).

Leptogenys jeanneli Santschi

(Text-figs 3, 31)

Leptogenys jeanneli Santschi, 1914c : 55, fig. 3. Holotype worker, TANZANIA: Grotte B. du Kulumuzi, à Tanga (st. no. 74), iv. 1912 (*Alhnaud & Jeannel*) (NM, Basle) [examined].

DIAGNOSIS OF WORKER. Entirety of head and body densely shagreened and opaque, with scattered larger punctures. Numerous standing hairs present on the dorsal surfaces of the head and body.

FURTHER DESCRIPTION. Worker. TL 9.6, HL 1.86, HW 1.72, CI 92, SL 1.94, SI 113, PW 1.08, PH 0.98, PL 0.94, LPI 104, DPW 0.72, DPI 76.

Head broader in front than behind, maximum width in front of eyes > 1.80 , width across occipital margin < 1.40 . Eyes large, ocular diameter at maximum 0.42, the maximum diameter much greater than the maximum width of the scape. Eyes with a pronounced

circumocular impression on their inner margins. Clypeus medially with a narrow, translucent fringing lamella. Mandibles long, narrow and curved, leaving a large gap between them at full closure. Outer margins of mandibular blades convex throughout their length, most strongly curved basally; tapering from base to apex and terminating in an acute apical tooth. Preapical teeth absent. Respective lengths of funicular segments 1-3 ca 0.28, 0.40, 0.34. Metanotal groove poorly developed, only weakly impressed and not cross-ribbed. Petiole in profile nodiform. Gaster strongly impressed between first and second segments. All surfaces of head and body are densely shagreened, with scattered larger punctures. Short, standing hairs numerous upon all dorsal surfaces. Short, greyish, dense pruinose pubescence abundant everywhere. Black, dull; the antennae, legs and mandibles brown.

This quite distinctive species is apparently known only from the holotype. It is easily separated from the other members of the group by its possession of standing hairs on the dorsal head and body, and by its large size.

Leptogenys maxillosa (F. Smith)

Ponera maxillosa F. Smith, 1858 : 93. Syntype workers, males, MAURITIUS: (*Dr Beke*) (BMNH) [examined].

Leptogenys maxillosa (F. Smith); Roger, 1861 : 43.

Leptogenys falcata Roger, 1861 : 42. Syntype workers, CUBA & BRAZIL (location of types not known). [Synonymy by Forel, 1901b : 46.]

Formica vinsonnella Dufour, 1864 : 210. Holotype ? worker, RÉUNION (location of type not known). **Syn. n.**

Leptogenys maxillosa var. *vinsonella* (Dufour); Emery, 1894 : 68; Forel, 1912b : 159 (Seychelles).

Leptogenys cribrata Emery, 1895a : 20. Syntype workers, SOUTH AFRICA: Vrijburg (*E. Simon*) (MCSN, Genoa). Provisional synonym.

DIAGNOSIS OF WORKER. Densely shagreened with scattered larger punctures. Without standing hairs. Petiole in dorsal view broader than long. Outer margin of mandible convex throughout its length.

FURTHER DESCRIPTION. *Worker.* TL 6.8-7.5, HL 1.38-1.48, HW 1.28-1.46, CI 91-98, SL 1.30-1.60, SI 101-110, PW 0.96-1.04, PH 0.84-0.90, PL 0.64-0.68, LPI 126-140, DPW 0.68-0.76, DPI 106-113 (8 measured).

Head broadened in front, the sides feebly convex and diverging anteriorly throughout their length. Eyes large, maximum diameter ca 0.32-0.36, considerably greater than the maximum width of the scape. Anterior clypeal margin with a narrow, translucent fringing lamella. Mandibles long and slender, the outer margins of the blades convex throughout their length. Node of petiole in dorsal view distinctly broader than long. Body and head everywhere densely shagreened with scattered larger punctures. Dense, pruinose pubescence present everywhere but standing hairs restricted to the clypeus and gastral apex.

L. maxillosa is a reasonably common tramp species throughout both the Old and New World Tropics, but appears to originate in the central and southern portions of the Ethiopian Region where it is a widely distributed but relatively uncommon species. Its closest relative within the group is *falcigera*, but in this species the petiole node is at least as long as broad, usually distinctly longer than broad, whilst in *maxillosa* the node is always considerably broader than long. In *maxillosa* the scapes are usually somewhat longer, SI 101-110, as opposed to SI 98-104 in *falcigera* and the LPI overlaps slightly, *falcigera* LPI 115-127 (mean 119), *maxillosa* LPI 126-140 (mean 133).

I have not been able to see the types of *vinsonnella* or *cribrata* but in the case of

the former I have examined series from numerous islands and systems near Réunion and all the specimens have been *maxillosa*. Similarly, *maxillosa* is the only species which fits the original description of *cribrata* and to the best of my knowledge is the only species of this group occurring in southern Africa. Consequently I have placed these two names in the synonymy of *maxillosa*, but I place *cribrata* there only provisionally as a future examination of the types may prove the present contention to be incorrect.

MATERIAL EXAMINED.

ZAIRE: 13 mi. N. of Kienge (*E. S. Ross & R. E. Leech*). RHODESIA: Bulawayo (*G. Arnold*); Honde Valley, Mtarazi R. (*W. L. Brown*). SOUTH WEST AFRICA: Lontpansberg (*Vernay-Lang*). SOUTH AFRICA: Natal, Dukuduku (*Grobler*). SEYCHELLES: Bird Is. (*V. Fitzgerald*); Dennis Is., Amirante Is., Coetivy Is. (*P. Sladen* expedition). MAURITIUS: (*J. E. M. Brown*). CHAGOS ARCHIPELAGO (*M. J. D. Hirons*). CUBA: Soledad, Cienfuegos (*N. A. Weber*); no loc. (coll. *F. Smith*).

Leptogenys pavesii Emery

(Text-fig. 1)

Leptogenys pavesii Emery, 1892 : 111. Syntype workers, SOMALIA (*Robecchi*) (MCSN, Genoa). *Leptogenys* (*Leptogenys*) *maxillosa* subsp. *sericea* Weber, 1942 : 46. Syntype workers, SUDAN: Imatong Mts, E. slope ca 4100 ft, 31.vii.1939 (*N. A. Weber*), (MCZ Cambridge) [examined].

Syn. n.

DIAGNOSIS OF WORKER. Densely shagreened with scattered larger punctures. Without standing hairs. Petiole in dorsal view longer than broad. Lamelliform margin of clypeus broad and often opaque. Outer margin of mandible straight or concave in part of its length.

FURTHER DESCRIPTION. *Worker*. TL 6.8–7.6, HL 1.40–1.62, HW 1.24–1.44, CI 88–90, SL 1.36–1.64, SI 107–114, PW 0.92–1.08, PH 0.80–0.92, PL 0.66–0.72, LPI 121–127, DPW 0.60–0.72, DPI 90–97 (6 measured).

Sides of head convex, the head not strongly broadened in front of the eyes, the sides more nearly parallel than in other members of the group. Eyes large, maximum diameter ca 0.32–0.36, greater than the maximum width of the scape. Fringing lamella of anterior clypeal margin broad and broadly and evenly rounded, usually opaque or semi-opaque. Mandibles curved basally, the outer margins convex for some distance beyond the basal curve, but beginning at about the midlength the outer margin becoming flat or more usually concave. Mandibles shorter and stouter than in other members of the group. Node of petiole in dorsal view longer than broad. Body densely shagreened as in the other species but the larger punctures are more sparse and usually less distinct than in *maxillosa* or *falcigera*. Standing hairs present only on the clypeus and gastral apex.

Notes on the separation of this species from its closest relatives are given under *falcigera*.

The range of *pavesii* does not appear to overlap that of *maxillosa* in the Ethiopian Region. All specimens of the former examined have come from the countries of east and north-east Africa whilst those of the latter originated in the central and southern parts of the continent. Like other members of this group *pavesii* is a tramp species and in this study I have examined specimens from Saipan, though whether this is Saipan in the Marianas or Saipan, Palau Is. is not clear.

MATERIAL EXAMINED.

SOMALIA: Dolo (*Vatova*). KENYA: Miongave, nr Mombasa (*L. F. Brown*); Ngong Forest Reserve (*G. Arnold?*). TANZANIA: Morogoro (*A. Loveridge*). CAMEROUN: no loc. (*G. Terron*). GUAM: Ladrone Is. (?). MARIANA or PALAU Is.?: Saipan (*R. K. Enders*).

THE STUHLMANNI-GROUP

(Text-figs 4-8, 19-21, 32)

Mandibles elongate, linear, usually increasing in width from base to apex, not closing against the clypeus. Eyes large or very large, their maximum diameter much greater than the maximum width of the scape. Second funicular segment considerably longer than the third, sometimes twice as long. Head broader in front than behind. Clypeus with a prominent median lobe. General shape of petiole as shown in Text-figs 19, 32. Metanotal groove impressed but without cross-ribs or sculpture. Gaster not or only very weakly constricted between the first and second segments.

Of the eleven species of this group seven are large or very large. Of these, five are distributed throughout eastern and southern Africa, with one also occurring on the Comoro Islands, and two are of central African origin. The four smaller species are known from West and Central Africa, with two in each area.

The group falls into two complexes of species, depending on the shape of the basal portion of the mandible. In *camerunensis* and its allies (*nebra*, *sterops*, *vindicis* and *zapyxis*) the mandible does not pass through a curve basally before its articulation (Text-fig. 5), and the blades of the long mandibles are usually approximately straight, without feebly convex outer margins. These five species are all of West or Central African origin.

The remaining species allied to *stuhlmanni* (*erythraea*, *leiothorax*, *schwabi*, *regis* and *titan*) are all from East or South Africa except the last, which comes from Cameroun. They have the base of the mandible curved before its articulation (Text-fig. 6), although this is indistinct in some populations of *schwabi*. The outer margin of the blade is usually slightly convex throughout its length in full-face view.

Leptogenys camerunensis Stitz

(Text-figs 5, 7, 32)

Leptogenys camerunensis Stitz, 1910 : 130. Syntype workers, CAMEROUN: Barombistation (*Preuss*) (NM, Basle) [examined].

Leptogenys stuhlmanni race *camerunensis* var. *angusticeps* Forel, 1916 : 399. Holotype worker, ZAIRE, St Gabriel (*Kohl*) (MHN, Geneva) [examined]. [Name not available.]

Leptogenys stuhlmanni subsp. *camerunensis* var. *opalescens* Wheeler, 1922 : 94. Syntype workers. ZAIRE: Akenge (*Lang & Chapin*) (MCZ, Cambridge) [examined]. [Name not available.]

DIAGNOSIS OF WORKER. Alitrunk without sculpture dorsally and only with cross-ribbing at meso-metapleural suture laterally. With blue or violet opalescence. Large species with very long antennal scapes, HL > 1.80, SI > 230.

FURTHER DESCRIPTION. Worker. TL 11.0-12.0, HL 1.90-2.02, HW 1.24-1.32, CI 65-66,

SL 2.92-3.38, SI 235-256, PW 1.24-1.30, PH 1.12-1.20, PL 1.06-1.12, LPI 105-107, DPW 0.72-0.74, DPI 64-70 (3 measured).

Head markedly broader in front than behind, the maximum width anteriorly in syntypes > 1.60 , width across occipital ridge < 0.90 . Eyes very large, maximum diameter ca 0.60, much greater than the maximum width of the scape. Inner margins of eyes with a circumocular impression. Mandibles long, more or less straight, gradually increasing in width apically and with a single preapical tooth. Mandibular blades not closing tightly against the clypeus, not curved basally before their articulation. Second funicular segment very long, respective lengths of segments 1-3 ca 0.50, 1.10, 0.56. Metanotal groove weakly impressed, not cross-ribbed. Gaster not constricted between first and second segments. Entire body smooth and shining, unsculptured apart from small pits from which hairs arise and some cross-ribs at the meso-metapleural suture. Erect hairs present on all dorsal surfaces. Colour red-brown or brown, the appendages lighter, and the head and alitrunk with weak blue or violet opalescence or reflections, which may be patchy.

One of the larger species of the group, *camerunensis* is distinguished primarily by its size and lack of sculpturation. The mandibles have a virtually straight outer margin and the blades are not curved outwards along their length. In this respect *camerunensis* shows affinities with *zapyxis* and *sterops*.

MATERIAL EXAMINED.

ZAIRE: Wombali (*P. Vanderijst*). CAMEROUN: no loc. (*G. Terron*).

Leptogenys erythraea Emery stat. n.

Leptogenys stuhlmanni subsp. *erythraea* [sic] Emery, 1902 : 33. Syntype workers, ETHIOPIA: Eritrea (*Belli*) MCSN, Genoa).

Leptogenys stuhlmanni subsp. *erythraea* Emery; Forel, 1907a : 131 et auctt. [Justified emendation.]

DIAGNOSIS OF WORKER. Metapleuron sculptured. Eyes large, maximum diameter 0.54 or more. Antennal scapes long, SI > 200 . Full adult colour brown. Large species, HL > 1.80 .

FURTHER DESCRIPTION. *Worker*. TL 9.7-10.8, HL 1.94-2.00, HW 1.28-1.34, CI 65-67, SL 2.72-2.80, SI 209-214, PW 1.20-1.24, PH 1.14, PL 0.94, LPI 121, DPW 0.68-0.70, DPI 73-74 (3 measured).

Head broader in front than behind, broadest across the clypeus. Eyes large, maximum diameter 0.54-0.56, much greater than the maximum width of the scape; the eyes breaking the outline of the sides of the head in full-face view. Clypeus with a prominent median lobe. Mandibles elongate and narrow, slightly curved along their length and passing through a more marked curve basally before their articulation. Funicular segments 1-3 with respective lengths ca 0.42-0.44, 0.84-0.86, 0.52-0.54. Gaster not constricted between first and second segments. Elongate standing hairs present upon all surfaces and on appendages. Head, pronotum and mesonotum unsculptured apart from minute pits from which hairs arise. Propodeal dorsum with feeble, nearly effaced sculpturation, with smooth areas. Meso- and metapleurae striate, strongest on metapleuron and extending onto the lower portions of the sides of the propodeum. Gaster unsculptured, smooth and shining. Full adult colour brown.

I have not seen the types of this species but have examined a series compared with type by Prof. W. L. Brown. These indicate that *erythraea* is a distinct species and not a subspecies of *stuhlmanni*. The male has been described by Forel (1907a).

MATERIAL EXAMINED.

ETHIOPIA: Eritrea, Ghinda (*Staudinger*).

Leptogenys leiothorax Prins stat. n.

Leptogenys stuhlmanni subsp. *leiothorax* Prins, 1965 : 154, fig. 1. Holotype and paratype workers, MOZAMBIQUE: Dondo 10.xii.1960 (G. Arnold) (SAM, Cape Town) [examined].

DIAGNOSIS OF WORKER. Dorsal alitrunk completely unsculptured. With blue or violet opalescence. Smaller species with shorter antennal scapes, HL < 1.75, SI < 220.

FURTHER DESCRIPTION. *Worker*. TL 8.3-9.1, HL 1.62-1.66, HW 1.10-1.14, CI 67-69, SL 2.34-2.42, SI 212-214, PW 1.04-1.08, PH 0.96-0.98, PL 0.88-0.90, LPI 109-111, DPW 0.54-0.58, DPI 61-64 (3 measured).

Head broader in front than behind, broader across the clypeus from corner to corner than across the eyes; sides of head convex. Eyes large, maximum diameter ca 0.44-0.50, breaking the outline of the sides of the head in full-face view. Clypeus with a prominent median lobe. Mandibles elongate, in full-face view weakly curved along their length, slightly more strongly curved basally before their articulations. Respective lengths of funicular segments 1-3 ca 0.32-0.40, 0.74-0.78, 0.42-0.46. Metanotal groove impressed but not cross-ribbed; gaster only extremely weakly constricted between first and second segments. All surfaces of body and appendages with numerous standing hairs. Dorsal surfaces of head and body completely unsculptured, smooth and shining except for small pits from which hairs arise. Propodeal declivity with a few transverse rugae. Sides of alitrunk unsculptured apart from cross-ribbing at the meso-metapleural suture and some rugosity around the area of the metapleural glands. Full adult colour deep red-brown with patchy bluish or violet opalescence.

At first sight this species is reminiscent of a small version of *camerunensis* as it is similarly sculptured and coloured, but its true affinities lie with *schwabi* which, apart from its lack of sculpturation, *leiothorax* closely resembles. In general shape and build and also in dimensions *leiothorax* is very close to *schwabi* but the lack of sculpture on the propodeum in the former will separate them. Also, in *leiothorax* the width of the head across the clypeus is greater than the width across the eyes, whereas in *schwabi* the two widths are approximately equal.

Leptogenys nebra sp. n.

DIAGNOSIS OF WORKER. Propodeum sculptured. Antennal scapes relatively long, SI > 200; eyes small, maximum diameter ca 0.36.

FURTHER DESCRIPTION. *Holotype worker*. TL 9.1, HL 1.84, HW 1.20, CI 65, SL 2.60, SI 217, PW 1.06, PH 0.98, PL 0.86, LPI 114, DPW 0.62, DPI 72.

Sides of head convex, broadest in front, distinctly broader across the clypeus from corner to corner than across the eyes. Eyes quite small for a member of this group, maximum diameter ca 0.36, but still distinctly greater than the maximum width of the scape. Clypeus with a prominent median lobe. Mandibles elongate, more or less straight in full-face view, increasing in width from base to apex and not passing through a curve basally before their articulations. Respective lengths of funicular segments 1-3 ca 0.32, 0.70, 0.48. Metanotal groove impressed but without cross-ribs. Gaster not constricted between first and second segments. All surfaces of head, body and appendages with numerous long, standing hairs, the longest of which on the scape are longer than the maximum scapal width. Dorsum of head, pronotum and gaster smooth and shining, unsculptured apart from hair-pits. Mesonotum and propodeal dorsum transversely rugose, the latter more coarsely than the former. Mesopleuron with some rugae above but the median portion tending to be smooth. Metapleuron and sides of propodeum rugose. Colour black, the appendages brown.

Holotype worker, CAMEROUN: Ototomo, 17.vi.1969, JLA (G. Terron) (BMHN).

This relatively small-eyed species is related to *sterops* and *zapyxis* but the combi-

nation of characters noted above, plus the lack of a convex lamella on the inner margin of the mandible will separate *nebra* from all other species of the group.

***Leptogenys regis* sp. n.**

(Text-fig. 8)

DIAGNOSIS OF WORKER. Propodeum and pronotum sculptured. Eyes not breaking outline of sides of head in full-face view. Large species with relatively short antennal scapes, $HL > 2.00$, $SI < 170$.

FURTHER DESCRIPTION. *Holotype worker.* TL 11.2, HL 2.24, HW 1.66, CI 74, SL 2.54, SI 153, PW 1.28, PH 1.14, PL 1.02, LPI 112, DPW 0.66, DPI 64.

Head much broader in front than behind, the width of the head across the eyes noticeably less than the width across the clypeus from corner to corner. Eyes large, maximum diameter 0.50 but not so strongly convex or prominent as in other members of the group so that the eyes in full-face view fail to break the outline of the sides of the head. Clypeus with a prominent median lobe. Mandibles elongate, feebly curved along their length and passing through a curve basally before their articulations. Lengths of funicular segments 1-3 ca 0.40, 0.76, 0.46. Dorsal surfaces of body with numerous short, standing hairs; hairs on the antennal scapes very short, scarcely longer than the underlying pubescence, without long hairs such as are found in other species of the group which are almost or quite as long as the scape is broad. Pits from which hairs arise conspicuous upon the cephalic dorsum. Pronotum, mesonotum and propodeum sculptured, the last much more strongly than the rest. Sides of alitrunk sculptured, with rugae on the pleurae. Gaster smooth and shining except for pits from which hairs arise.

Paratype worker. As holotype but slightly larger, TL 11.4, HL 2.24, HW 1.64, CI 73, SL 2.62, SI 159, PW 1.28, PH 1.24, PL 1.12, LPI 110, DPW 0.68, DPI 61. Eyes ca 0.50 at maximum; funicular segments 1-3 ca 0.42, 0.80, 0.50 respectively.

Holotype worker, KENYA: Shimba Forest Reserve, vi.1957 (*N. L. H. Krauss*) (BMNH).

Paratype worker, TANZANIA: Dar-es-Salaam, College Campus, 1969 (*Ilse Walker*) (MCZ, Cambridge).

This large species and the related *titan* are easily differentiated from other members of the group by the failure of the eyes to break the outline of the sides of the head in full-face view and by the lack of long, standing hairs on the antennal scapes. In all other large species of the group the scape is equipped with numerous long hairs, the longest of which are at least equal to or more usually greater than the maximum width of the scape, whereas in *regis* and *titan* the hairs which are present are short, often not much longer than the scapal pubescence. The two species, *regis* and *titan*, are separated by characters of size and differences of sculpturation, as the latter is much larger than the former and has the pronotum unsculptured.

***Leptogenys schwabi* Forel**

Leptogenys schwabi Forel, 1913c : 208. Holotype worker, RHODESIA: Bulawayo (*G. Arnold*) (MHN, Geneva) [examined].

DIAGNOSIS OF WORKER. Propodeum sculptured. Maximum diameter of eye < 0.50 , the eyes breaking the outline of the sides of the head in full-face view. Antennal scapes long, SI > 200 . Width of head across eyes the same as or only slightly less than the width across the clypeus from corner to corner.

FURTHER DESCRIPTION. *Worker.* TL 8.4–9.8, HL 1.60–1.82, HW 1.08–1.22, CI 64–68, SL 2.28–2.54, SI 203–211, PW 1.04–1.14, PH 0.92–1.10, PL 0.88–1.00, LPI 104–113, DPW 0.54–0.64, DPI 62–64 (12 measured).

Head broader in front than behind. In front of the eyes the sides of the head slightly convex so that the width of the head across the clypeus from corner to corner anteriorly is the same as or only slightly more than the width across the centre of the eyes. Eyes large and convex but not very large as in some members of the group, maximum diameter ca 0.44–0.48. Clypeus with a prominent median lobe. Mandibles elongate, in most specimens feebly curved along their length and passing basally through a curve before their articulations. Funicular segments 1–3 ca 0.34–0.40, 0.64–0.76, 0.42–0.46 respectively. All surfaces of body and appendages with numerous standing hairs. Dorsum of head smooth and shining, unsculptured apart from small pits from which hairs arise. Pronotal dorsum similar but very rarely with faint traces of sculpturation on the extreme posterior portion of the sclerite. Propodeal dorsum with transverse rugae. Pleurae and sides of propodeum sculptured. Gaster unsculptured apart from hair-pits.

In the past this species has been confused with *stuhlmanni*. The misidentification of specimens of *schwabi* as *stuhlmanni* and the consequent misapplication of the latter name is common in collections. In the BMNH collection, for example, series which were all *schwabi* had been labelled as such and also as *stuhlmanni*. Prins (1965) reduced *schwabi* to a variety of *stuhlmanni*, basing his argument on specimens collected by Arnold and Grobler in Rhodesia and South Africa respectively. All these specimens were determined by Arnold and were in fact all *schwabi* (*stuhlmanni* remains unknown in Rhodesia and South Africa). Prins's argument that he could find very little difference between the two 'species' in these series was therefore correct as all were *schwabi* but some of them had been misidentified as *stuhlmanni*.

The cause of this confusion appears to stem from Arnold's (1915) record of *stuhlmanni* from Durban. I have examined this series and they are in fact *schwabi*, though slightly larger than is usual in this species. The two are separable on a number of characters, many of which were in fact noted in the original descriptions of Mayr and Forel but subsequently not used.

L. stuhlmanni is a larger, more stockily built species than *schwabi*, with relatively shorter antennal scapes (compare measurements). The head is broader in front in *stuhlmanni* and the eyes are less prominent, so that the width of the head across the eyes is noticeably less than the width across the clypeus from corner to corner. The pronotal dorsum is completely sculptured in *stuhlmanni* whereas in *schwabi* it is usually smooth, although in some specimens faint traces of sculpture are present posteromedially. Pits from which hairs arise on the cephalic dorsum are small and inconspicuous in *schwabi* but larger and more distinct in *stuhlmanni*.

MATERIAL EXAMINED.

RHODESIA: Bulawayo (*G. Arnold*); Chirinda Forest (*G. Arnold*); Umtali (*G. Arnold*). SOUTH AFRICA: Natal, Umhlanga (*G. Arnold?*); Natal, Durban (*G. Arnold*); Durban (*C. B. Cooper*); Zululand, Eshowe (*R. E. Turner*).

Leptogenys sterops sp. n.

(Text-fig. 20)

DIAGNOSIS OF WORKER. Smaller species, HL < 1.60. Propodeum and metapleuræ sculptured. Mandibles without a lamelliform extension of the inner margin.

FURTHER DESCRIPTION. *Holotype worker*. TL 8.2, HL 1.56, HW 1.06, CI 68, SL 1.98 SI 183, PW 0.96, PH 0.86, PL 0.72, LPI 119, DPW 0.52, DPI 72.

Head broader in front than behind but not strongly broadened in front of the eyes; the sides feebly convex, the occipital border marginate. Ocular diameter 0.40 at maximum, greater than the maximum width of the scape. Clypeus with a prominent median lobe. Mandibles elongate but not linear, increasing in width from base to the level of the single preapical tooth then narrowing again to the apex; the inner margin feebly convex basad of the preapical tooth. Mandibular blades not passing through a curve basally before their articulations. Second funicular segment very long, the respective lengths of segments 1-3 ca 0.30, 0.52, 0.36. Alitrunk elongate; metanotal groove not cross-ribbed. Node of petiole in profile high and narrow, the anterior and posterior faces both feebly convex and converging dorsally, the anterior and dorsal faces forming a single convex curve. Gaster very weakly constricted between the first and second segments. Standing hairs numerous on all surfaces. Head, pronotum, petiole and gaster unsculptured apart from minute pits from which hairs arise. Propodeal dorsum rugose, predominantly transversely so. Metapleuron and sides of propodeum regularly rugose. Mesopleuron with rugae developed only in the upper and extreme lower portions, the greater part of the sclerite between these areas with the sculpture wholly or partially effaced and with smooth, shining areas. Colour principally dark brown, the appendages lighter, the head and propodeum darker, black in places.

Paratype workers. TL 8.0-8.2, HL 1.54-1.56, HW 1.02-1.06, CI 66-69, SL 1.98-2.00, SI 183-194, PW 0.94-0.98, PH ca 0.86 PL 0.68-0.72, LPI 119-126, DPW 0.52-0.58, DPI 72-85 (5 measured). Ocular diameter ca 0.40; length of funicular segments 1-3 ca 0.28-0.30, 0.48-0.52, 0.34-0.36. As holotype but in one specimen with the mesopleuron almost covered with very fine striation.

Holotype worker, IVORY COAST: Banco Forest, nr Abidjan, 13. i. 1963, no. A72 (*W. L. Brown*) (MCZ, Cambridge).

Paratype workers. IVORY COAST: 5 with same data as holotype; 1 worker, O.R.S.T.O.M. Res. Sta., 17 km W. of Abidjan, 7.i.1963, no. A1 (*W. L. Brown*) (BMNH; MCZ, Cambridge).

This species, the smallest yet discovered in the *stuhlmanni*-group, is most closely related to *zapyxis*, also from West Africa. The two are easily distinguished as in *sterops* the mandible increases in width from the base towards the apex and is widest at the preapical tooth. Also, the inner margin of the blade lacks a lamelliform extension and is only feebly convex at most. In *zapyxis* on the other hand the inner margin of each mandibular blade is equipped with a semi-translucent, lamella-like extension which is convex in outline, and the mandible usually attains its maximum width at a point proximal to the preapical tooth.

Leptogenys stuhlmanni Mayr

(Text-fig. 6)

Leptogenys (Lobopelta) stuhlmanni Mayr, 1893 : 198. Syntype workers, MOZAMBIQUE: Quilimane (*Stuhlmann*) (location of types not known).

Leptogenys comorensis Forel, 1907b : 76. Syntype workers, COMORO ISLANDS: Mohali (Voeltzkow) (NM, Basle; MCZ, Cambridge) [examined]. **Syn. n.**

DIAGNOSIS OF WORKER. Propodeum sculptured. Large species with relatively short antennal scapes, HL > 1.75, SI < 200. Pronotal dorsum feebly sculptured. Eyes breaking outline of sides of head in full-face view.

FURTHER DESCRIPTION. *Worker*. TL 9.6–10.4, HL 1.82–2.00, HW 13.2–14.6, CI 68–74, SL 2.32–2.70, SI 180–194, PW 1.16–1.26, PH 1.10–1.18, PL 1.02–1.06, LPI 104–115, DPW 0.62–0.70, DPI 61–68 (6 measured).

Head broader in front than behind, distinctly broadened in front of the eyes. Eyes large. their maximum diameter 0.50–0.54, much greater than the maximum width of the scape. In full-face view the eyes breaking the outline of the sides of the head. Clypeus with a prominent median lobe. Mandibles long, usually very slightly curved along their length, characteristically passing through a curve basally before their articulations. Respective lengths of funicular segments 1–3 ca 0.40–0.42, 0.74–0.76, 0.46–0.48. Metanotal groove not cross-ribbed. Gaster not constricted between first and second segments. All surfaces of body and appendages with numerous standing hairs. Pits on dorsum of head from which hairs arise usually large and conspicuous. Dorsum of pronotum and sometimes also the sides weakly sculptured. Dorsum and sides of propodeum and the pleurae rugose. Dorsum of petiole usually feebly sculptured. Gaster smooth and shining, unsculptured apart from hair-pits.

One of the three large, black species of the group which inhabit eastern and southern Africa and its offshore islands, *stuhlmanni* is distinguished from *regis* by size, the convexity of the eyes, which break the outline of the sides in *stuhlmanni* but not in *regis*, and by the presence of numerous long hairs upon the antennal scapes which are absent in *regis*. The other closely related species, *schwabi*, tends to be smaller and less stockily built than *stuhlmanni*, with relatively longer antennal scapes and finer sculpturation. On the dorsum of the head the pits from which hairs arise are distinct and quite large in *stuhlmanni* and the pronotal dorsum is sculptured, whereas in *schwabi* the hair-pits are small and inconspicuous and the pronotum is usually unsculptured, although some individuals may have slight sculpturation. Finally, in *schwabi* the width of the head across the eyes is the same as or only slightly less than the width across the clypeus from corner to corner, whereas in *stuhlmanni* the corner to corner clypeal width is distinctly greater than the width across the eyes as the head is more strongly broadened in front in this species.

There seems to be little doubt that *stuhlmanni* and *schwabi* were confused by earlier authors (see under *schwabi*) and records of distribution of the species published to the present should be used with some caution.

I have not been able to find the types of *stuhlmanni* but Dr M. Fischer (NM, Vienna) has lent me two workers collected by Stuhlmann in Mozambique and named by Mayr himself, which are taken as the basis for my interpretation of this species.

MATERIAL EXAMINED.

SUDAN: Imatong Mts (N. A. Weber). KENYA: Nakuru (E. S. Ross & R. E. Leech); Mombasa (N. A. Weber). MOZAMBIQUE: (*Stuhlmann*, ex coll. G. Mayr).

Leptogenys titan sp. n.

DIAGNOSIS OF WORKER. Propodeum unsculptured. Eyes not breaking outline of sides of head in full-face view. Very large species with relatively short antennal scapes, HL > 2.10, SI < 170.

FURTHER DESCRIPTION. *Holotype worker*. TL 13.6, HL 2.30, HW 2.02, CI 88, SL 3.24, SI 160, PW 1.62, PH 1.36, PL 1.18, LPI 115, DPW 0.76, DPI 64.

Sides of head strongly divergent anteriorly, the head much broader across the clypeus than across the eyes. Eyes large, maximum diameter ca 0.66, distinctly failing to break the outline of the sides of the head in full-face view. Maximum diameter of the eyes considerably greater than the maximum width of the scapes. Clypeus with a prominent median lobe. Mandibles very long, only slightly broadened apically, the blades passing through a distinct curve basally before their articulations. Respective lengths of funicular segments 1-3 ca 0.50, 1.02, 0.66. Metanotal groove without cross-ribs. Gaster weakly impressed between first and second segments. Head, body and appendages with numerous, relatively short, standing hairs. On the antennal scapes in dorsal view no hairs are present which exceed the maximum width of the scape. Dorsum of head, pronotum, propodeum and gaster unsculptured apart from hair-pits. Mesonotum with a number of very faint transverse striae, particularly upon the median portion of the sclerite. Sides of alitrunk unsculptured except for cross-ribbing at the meso-metapleural suture and a few rugae on the bulla of the metapleural glands. Colour black, appendages dark brown.

Holotype worker, CAMEROUN: Ngoa-Ekelé 4.i.1969 (*G. Terron*) (BMNH).

L. titan is most closely related to *regis* of east Africa but is larger than that species and lacks propodeal sculpturation. These two species are the only members of the group in which the eyes fail to break the outline of the sides of the head in full-face view.

Leptogenys vindicis sp. n.

DIAGNOSIS OF WORKER. Head and dorsal alitrunk sculptured. Antennal scapes relatively long, SI > 200; smaller species, HL < 1.75.

FURTHER DESCRIPTION. *Holotype worker*. TL 9.0, HL 1.64, HW 1.14, CI 69, SL 2.38, SI 209, PW 1.12, PH 0.96, PL 0.80, LPI 120, DPW 0.68, DPI 85.

Head broader in front than behind but the width of the head across the clypeus only very slightly more (ca 0.02) than the width across the eyes in full-face view. Eyes large, maximum diameter ca 0.50, much greater than the maximum width of the scape. Clypeus with a prominent median lobe. Mandibles long, slightly broader apically than basally, passing through a very feeble curve near the base. Funicular segments 1-3 ca 0.34, 0.68, 0.38 respectively. Gaster feebly constricted between first and second segments. All surfaces of head, body and appendages with numerous standing hairs. All dorsal surfaces of head and body finely sculptured except for the gaster, metanotal groove and area immediately behind the promesonotal suture, which are smooth and shining. Sculpture takes the form of fine, disorganised rugulation with a few larger rugae, so that the surfaces appear matt or only dully shining. Sides of alitrunk with more distinctly separated rugae and with some shining areas on the pronotum and pleurae. Colour a very deep brown, almost black, the gaster lighter brown, the appendages mid-brown and shining.

Holotype worker, CAMEROUN: Mt Nkolodon, JLA, 19.v.1969, 900-1000 m (*G. Terron*) (BMNH).

Leptogenys zapyxis sp. n.

(Text-figs 4, 19, 21)

DIAGNOSIS OF WORKER. Propodeum and metapleuron sculptured. Inner margin of mandible extended by a convex, semi-translucent lamella.

FURTHER DESCRIPTION. *Holotype worker*. TL 9.0, HL 1.78, HW 1.16, CI 65, SL 2.40, SI 207, PW 1.08, PH 0.92, PL 0.82, LPI 112, DPW 0.62, DPI 76.

Head broader in front than behind, the sides weakly convex and diverging anteriorly. Occipital border marginate. Eyes with maximum diameter ca 0.42, much greater than the maximum width of the scape. Clypeus with a prominent, truncated median lobe. Mandibles elongate, their outer margins straight to feebly concave, the inner margins convex, with a semi-translucent, lamellate extension forming the true inner margin and imparting the convexity to the border. Second funicular segment elongate, respective lengths of segments 1-3 ca 0.36, 0.64, 0.42. Metanotal groove not cross-ribbed. Petiole in profile with the anterior and posterior faces convex and sloping towards one another dorsally, the anterior and dorsal faces united in a continuous curve. Gaster very feebly constricted between first and second segments. All surfaces with numerous standing hairs. Head, pronotum, petiole and gaster unsculptured apart from hair-pits. Dorsum and sides of propodeum and metapleuron rugose. Mesopleuron with some effaced sculpturation but with extensive smooth areas. Black, the appendages lighter.

Paratype workers. TL 8.1-9.0, HL 1.62-1.80, HW 1.04-1.18, CI 64-66, SL 2.18-2.44, SI 200-209, PW 0.96-1.08, PH 0.88-0.92, PL 0.76-0.84, LPI 109-118, DPW 0.58-0.64, DPI 73-77 (7 measured). Ocular diameter at maximum ca 0.38-0.44; respective lengths of funicular segments 1-3 ca 0.30-0.36, 0.60-0.64, 0.38-0.42. As holotype but colour varying from dark brown to black.

Holotype worker, GHANA: Mt Atewa, 22.x.1968 (*C. A. Collingwood*) (BMNH).

Paratypes. GHANA: 1 worker, same data as holotype; 6 workers, Tafo, 26.vi.1970, in wet-rotten log (*B. Bolton*); 3 workers, Tafo 3.viii.1966, ant ecology sample 150C (*D. Leston*); 2 workers, Tafo 2.viii.1966, ant ecology sample 144A (*D. Leston*) (BMNH; MCZ, Cambridge; NM, Basle; MNHN, Paris).

THE *SULCINODA*-GROUP

(Text-figs 9-14, 26, 27)

Mandibles variously developed, either short and closing tightly against the clypeus or linear and curved, enclosing a space between themselves and the clypeus when closed. Eyes medium or large, but always with their greatest diameter in full-face view greater than the maximum width of the scape. Second funicular segment equal to or slightly longer than the third. Head usually broader in front than behind; more markedly so in some species than in others. Sculpture variable but never with the entire dorsal head and alitrunk rugose, nor shagreened. Gaster constricted between first and second segments. Metanotal groove cross-ribbed or otherwise sculptured.

The *sulcinoda*-group includes 13 species which fall roughly into two complexes depending upon whether the mandibles are capable of closing tightly against the clypeus or not. In general there are two criteria which determine whether full closure is possible, the first being the length of the mandible itself and the second the size of the median lobe of the clypeus. These seem interdependent and modifications occur simultaneously, for as the mandible lengthens and narrows the clypeal lobe becomes shorter and narrower.

Species with relatively shorter, broader mandibles and longer, broader clypeal lobes are connected to those with longer, narrower mandibles and shorter, narrower clypeal lobes by intermediates such as *princeps*, and illustrate and support the contention that long-mandibulate forms have arisen from short-mandibulate stock several times within the genus.

All members of the group are small to medium-sized species and the majority appear to be confined to rather densely forested areas, especially in West and Central Africa.

Leptogenys bellii Emery

Leptogenys bellii Emery, 1901: 59. Syntype workers, ETHIOPIA: Eritrea, Ghinda (*Belli*) (MCSN, Genoa).

I have not been able to examine the types of this species nor have I seen any material which matches the original description, but the description is good enough to recognise *bellii* as a member of the *sulcinoda*-group. The following description is modified from the original.

Worker. TL 6.0. Head longer than broad, narrower behind than in front, with the occipital margin straight or feebly concave. Eyes large. Median lobe of clypeus short, blunt (truncated?) apically. Mandibles weakly curved, narrow, slightly broadening apically where they terminate in a point. Scapes surpassing occipital margin by less than twice their diameter. Node of petiole a little longer than broad, almost as high as long; in profile the anterior and posterior faces vertical. Anterodorsal angle rounded, posterodorsal angle acute. In the middle of the dorsum is a narrow, shining zone, a little elevated but not cariniform. Posterior face of petiole bordered by a sharp corner, a little projecting in the middle of the superior margin where it forms an obtuse tubercle. Vertex smooth, with small piligerous punctures which become larger and more numerous towards the sides and may even be confluent behind the eyes. On pro- and mesonotum the punctures are separate on the dorsum, confluent on the sides and larger than those of the head; larger and confluent on sides of propodeum. Meso- and metapleurae partly sculptured. Sides of petiole with confluent punctures. Gaster shining, with minute piligerous punctures. Standing hairs present on dorsal surfaces. Black, shining, the appendages reddish.

The description gives the impression of an average-sized member of the *sulcinoda*-group most probably related to *elegans* and *ferrarii* but separated from them by details of petiolar structure and sculpturation.

Leptogenys elegans sp. n.

(Text-fig. 9)

DIAGNOSIS OF WORKER. Upper halves of sides of petiole not sulcate. Dorsum of head, alitrunk and first gastral tergite unsculptured apart from large hair-pits.

FURTHER DESCRIPTION. *Holotype worker.* TL 4.8, HL 1.00, HW 0.72, CI 72, SL 0.90, SI 125, PW 0.62, PH 0.62, PL 0.46, LPI 135, DPW 0.48, DPI 104.

Head slightly wider in front of the eyes than behind, the sides feebly convex. Eyes with maximum diameter ca 0.24, greater than the maximum width of the scape in full-face view. Median lobe of clypeus prominent, broadest basally, rounded anteriorly and with convex sides. Mandibles elongate and narrow, not closing tightly against the clypeus, enclosing a large space when their apices are overlapping. Lengths of funicular segments 1–3 respectively

ca 0.16, 0.16, 0.14. Gaster strongly constricted between first and second segments. Dorsum of head with numerous shallowly incised punctures separated by smooth, shining interspaces. Sides and ventral surface of head unsculptured apart from scattered hair-pits. Dorsal alitrunk unsculptured apart from crossribbing in the metanotal groove and scattered, large, pit-like punctures from which hairs arise. Sides of alitrunk also with pit-like punctures and the metapleuron and extreme lower region of the mesopleuron with longitudinal rugulae. Upper halves of sides of petiole with some rugulation. First and second gastral tergites with scattered but strongly marked large hair-pits, otherwise unsculptured. All surfaces of body and appendages with standing hairs. Colour black, shining; the legs, antennae and mandibles brown.

Paratype workers. As holotype but with size range as follows: TL 4.5–4.9, HL 0.96–1.02, HW 0.68–0.72, CI 70–72, SL 0.86–0.94, SI 125–138, PW 0.58–0.62, PH 0.56–0.62, PL 0.44–0.48, LPI 127–135, DPW 0.42–0.48, DPI 95–105 (8 measured).

Ocular diameter 0.20–0.24, and size range of funicular segments 1–3 ca 0.16–0.18, 0.14–0.16, 0.12–0.14 respectively. Sculpturation of metapleuron and sides of propodeum variable. In most specimens it is as in the holotype but in some the rugulae are reduced or absent in places whilst in others the rugulae are more extensive and also occur on the propodeal sides.

Holotype worker, NIGERIA: Gambari, 10.ix.1969, in rotten stump (*B. Bolton*) (BMNH).

Paratypes. 2 workers with same data as holotype. IVORY COAST: 5 workers, 40 km W. of Abidjan, 14.i.1963, A97, Plantation Niecky (*W. L. Brown*). GHANA: 1 worker, Pankese Cocoa Station, 10.ix.1969 (*C. A. Collingwood*); 4 workers, Bunso, 7.vii.1969, pyrethrum knockdown B2/2 (*D. Leston*); 2 workers, Bunso, 30.vii.1969, pyrethrum knockdown B8/1 (*D. Leston*); 1 worker, Tafo, 8.x.1966, ant ecology sample 318F (*D. Leston*); 1 worker, Asikaisu, 9.ix.1969, ant ecology sample AM70 (*D. Leston*) (BMNH; MCZ, Cambridge; NM, Basle).

The nest from which the holotype was taken was situated in the stump of a rotten tree branch about 2 feet above ground level. This species appears to be subarboreal as a number of specimens were collected by Leston as they were running on tree trunks, and some were acquired by pyrethrum knockdown from cocoa trees.

This species appears to be closely related to *ferrarii*, and notes on their separation are given under the latter.

Dr G. Terron (UFC, Yaounde) has sent me specimens of this species from Byime-Assi, in Cameroun.

Leptogenys excellens sp. n.

DIAGNOSIS OF WORKERS. Sides of head below and behind eyes and lateral portions of ventral surface of head sculptured. Upper halves of sides of petiole not sulcate.

FURTHER DESCRIPTION. *Holotype worker.* TL 5.0, HL 1.00, HW 0.72, CI 72, SL 0.92, SI 128, PW 0.66, PH 0.66, PL 0.44, LPI 150, DPW 0.46, DPI 104.

Head broader in front than behind, the sides feebly convex, the occipital margin in full-face view extremely shallowly concave, almost straight. Eyes large, maximum diameter 0.24, their diameter greater than the maximum width of the scape. Inner and posterior margins of eye with a weak circumocular impression. Median lobe of clypeus short, triangular, narrowly rounded apically. Mandibles long and curved, not closing against the clypeus. Relative lengths of funicular segments 1–3 ca 0.16, 0.18, 0.16. Petiole in profile with the anterior face vertical, the posterior face feebly sinuate and higher than the anterior, so that the dorsum slopes upwards posteriorly. Anterodorsal angle broadly rounded, posterodorsal angle also rounded but noticeably more acute. Petiole in dorsal view slightly broader than long, scarcely narrowing anteriorly. Gaster constricted between first and second segment. All surfaces

of body and appendages with numerous standing hairs. Dorsum of head with numerous coarse punctures, the spaces between them feebly reticulate. Sides of head behind and below the eyes with weak rugosity, the ventral surfaces of the head complexly sculptured on their lateral portions by a number of short, shallow indentations and numerous fine punctures. Dorsum of alitrunk with scattered large punctures, the posterior margins of many of which are indistinct on the pronotum. Meso- and metapleurae reticulate-punctate but each with a shining median area, more extensive on the former. Upper halves of sides of petiole in profile reticulate-rugose with many small punctures. Gaster unsculptured apart from hair-pits. Black, shining, the gaster dark brown and polished, the appendages lighter brown; the antennal funiculae lighter in colour than the scapes.

Paratype worker. As holotype, with dimensions as follows; TL 5.0, HL 0.98, HW 0.72, CI 73, SL 0.92, SI 128, PW 0.62, PH 0.64, PL 0.44, LPI 145, DPW 0.44, DPI 100. Diameter of eye 0.24, lengths of funicular segments 1-3 ca 0.16, 0.16, 0.14.

Holotype worker, ZAIRE: Yangambi Reserve, 0949 (*A. Raignier & J. van Boven*) (MCZ, Cambridge).

Paratype. 1 worker, same data as holotype (BMNH).

Leptogenys ferrarii Forel

Leptogenys ferrarii Forel, 1913c : 209. Syntype workers, RHODESIA: Bulawayo, 23.ii.1913 (*G. Arnold*) (MHN, Geneva) [examined].

Leptogenys ferrarii st. *dentatula* Santschi, 1915 : 246. Holotype worker, ZAIRE: Katanga, Katakai (*Gérard*) (NM, Basle) [examined]. **Syn. n.**

Leptogenys ferrarii race *dentulata* Santschi; Bernard, 1952 : 210. [Lapsus.]

DIAGNOSIS OF WORKER. Upper halves of sides of petiole not longitudinally sulcate. Hairs on first gastral tergite not arising from large pits.

FURTHER DESCRIPTION. *Worker.* TL 4.1-4.3, HL 0.84-0.86, HW 0.64-0.66, CI 74-78, SL 0.80-0.82, SI 124-125, PW 0.54-0.60, PH 0.50-0.58, PL 0.36-0.40, LPI 142-147, DPW 0.40-0.46, DPI 105-115 (5 measured).

Head only slightly broader in front of eyes than behind, the sides convex; the occipital margin in full-face view weakly concave. Eyes large, maximum diameter 0.18-0.20, with a weak circumocular impression on the internal and posterior margins. Diameter of eye much greater than maximum width of scape. Median lobe of clypeus triangular, narrowed anteriorly, almost pointed. Mandibles elongate, not closing against the clypeus. Respective lengths of funicular segments 1-3 ca 0.16, 0.14, 0.12. Petiole in dorsal view broader than long, broadest posteriorly. Node narrow and high in profile, the dorsal surface sloping upwards posteriorly but only slightly so. Gaster impressed between first and second segments. Dorsum of head only with small pits from which hairs arise. Dorsal alitrunk with larger shallow punctures which are best defined on the pronotum. In some specimens they are absent from the propodeal dorsum and may be effaced on the pronotum so that the dorsal alitrunk is largely smooth and shining. Meso- and metapleurae with weak rugulation, sometimes also finely punctate, but always with extensive unsculptured areas. Gaster unsculptured, smooth and shining apart from minute hair-pits. Full adult colour dark brown, the appendages lighter.

This species seems most closely related to *elegans* but the two are separated by the construction of the petiole, as reflected by their indices, and also by their sculpturation and colour, as noted in the key. Also, the sides of the head are less convex in *elegans* and the head broadens more markedly anteriorly.

MATERIAL EXAMINED.

RHODESIA: Lonely Mine (*H. Swale*); Cecil Kop nr Umtali (*W. L. Brown*).

Leptogenys longiceps Santschi

Leptogenys longiceps Santschi, 1914a : 328, fig. 13. Holotype worker, SENEGAL: Dakar (F. Silvestri) (IE, Naples).

DIAGNOSIS OF WORKER. Mesopleuron completely sculptured. Median clypeal lobe very short and bluntly rounded.

FURTHER DESCRIPTION. *Worker*. TL 4.2–4.5, HL 0.88–0.96, HW 0.70–0.72, CI 74–80, SL 0.76–0.86, SI 108–120, PW 0.58–0.62, PH 0.54–0.60, PL 0.42–0.46, LPI 128–136, DPW 0.40–0.46, DPI 95–100 (7 measured).

Head slightly broadened in front of eyes. Maximum diameter of eyes 0.18–0.22. Median lobe of clypeus developed as in *trilobata* (Text-fig. 11) but much shorter and narrower. Mandibles elongate, not closing against the clypeus. Length of funicular segments 1–3 ca 0.16, 0.16, 0.14 respectively. Head everywhere with scattered fine punctures dorsally, anteriorly also with a very fine superficial reticulation which extends from the posterior clypeal margin almost to the level of the posterior margin of the eye. Laterally and ventrally the head unsculptured apart from hair-pits. Dorsal alitrunk with numerous low, rounded rugulae overlaid by a dense reticulate-punctuation. Posterior portion of pronotal dorsum unsculptured, smooth and shining. Sides of pronotum very finely rugulose, mesopleuron, metapleuron and sides of propodeum more coarsely rugulose and also covered with a dense reticulate-punctuation. Upper halves of sides of petiole reticulate-punctate, this sculpture superimposed upon a rather coarser rugulation. Gaster smooth and shining apart from hair-pits.

The shape of the median lobe of the clypeus in this species resembles that found in *trilobata* but in a much reduced condition. However, the marked differences in sculpture between the two easily serve to separate them. In terms of sculpturation the species most closely resembling *longiceps* is *excellens*, but in this latter species the sculpture of the cephalic dorsum is continued on the sides and ventre.

MATERIAL EXAMINED.

GHANA: Legon (*D. Leston*); Legon (*Mkhize*).

Leptogenys mastax sp. n.

(Text-figs 12, 27)

DIAGNOSIS OF WORKER. Petiole node with upper halves of sides longitudinally sulcate. Dorsum of head reticulate-punctate. Pronotum strongly sculptured. HL > 1.00, SI > 145.

FURTHER DESCRIPTION. *Holotype worker*. TL 4.9, HL 1.06, HW 0.66, CI 62, SL 1.02, SI 154, PW 0.62, PH 0.66, PL 0.46, LPI 143, DPW 0.44, DPI 95.

Head elongate, narrow, slightly broadened in front, the sides more or less straight and the occipital margin in full-face view weakly concave. Maximum diameter of eyes 0.24, greater than the maximum width of the scape. Inner and posterior borders of eyes with a circumocular impression. Median clypeal lobe long, triangular and quite broad. Mandibles relatively short, capable of closing tightly against the clypeus. Antennal scapes relatively long (SI > 140); lengths of funicular segments 1–3 respectively ca 0.18, 0.20, 0.16. Node of petiole in dorsal view broadest posteriorly, the upper halves of the sides converging strongly dorsally so that the actual dorsal surface of the node is a narrow strip. In profile the posterior face of the node feebly concave, the anterior feebly convex; the posterior face much higher than the anterior so that the dorsal surface slopes upwards posteriorly and is slightly convex. Gaster constricted between first and second segments. All surfaces of body and appendages with standing hairs. Dorsum of head reticulate-punctate, the sides behind the eyes with a fine, superficial reticulation, the ventral surface unsculptured. Pronotal dorsum rough, with dense punctulation. The

extreme posterior portion of the pronotum smooth and shining and with finger-like projections leading anteriorly into the sculptured area. Remainder of dorsum densely punctulate and with a few fine rugulae. Sides of pronotum finely reticulate, the meso- and metapleurae with some fine rugulae and a few punctures but with extensive smooth areas, especially upon the former. Upper halves of sides of petiole strongly longitudinally sulcate, the lower halves shiny and unsculptured. Gaster with only minute hair-pits. Black, the appendages brown.

Paratype workers. TL 4.7–5.0, HL 1.04–1.10, HW 0.66–0.70, CI 62–64, SL 0.98–1.08, SI 148–156, PW 0.62–0.64, PH 0.62–0.66, PL 0.42–0.46, LPI 139–147, DPW 0.42–0.44, DPI 92–100 (7 measured). Ocular diameter 0.22–0.26; lengths of funicular segments 1–3 ca 0.16–0.18, 0.20–0.22, 0.16–0.20. Otherwise as holotype.

Paratype females. Ergatoid; fitting description of worker but the petiole is modified and the gaster swollen. In the females examined the second gastral segment measured 0.92–0.96 high in profile and 0.86–0.92 wide in dorsal view. This is compared to measurements of 0.76–0.78 and 0.72–0.76 respectively in workers of the same series. Dimensions of the females are: HL 1.06–1.08, HW 0.68–0.70, CI 63–65, SL 0.96–1.02, SI 141–147, PW 0.62–0.64, PH 0.68–0.70, PL 0.40–0.42, LPI 162–171, DPW 0.48–0.50, DPI 119–125, ocular diameter 0.24–0.26 (4 measured). These compare well with the worker except that the scapes are relatively slightly shorter and the petiole is noticeably narrower in profile and broader in dorsal view. Ocelli are absent and the alitrunk is similar to that of the worker as flight sclerites are not developed.

Holotype worker, GHANA: Mt Atewa, 12.vi. 1970, under rotten twig on path (*B. Bolton*) (BMNH).

Paratypes. GHANA: 5 workers, Mt Atewa, ant ecology sample 138E, 29.vii.1966 (2 workers); ant ecology sample 139C, 29.vii.1966 (1 worker); ant ecology sample 161E, 5.viii.1966 (1 worker); ant ecology sample 164C, 5.viii.1966 (1 worker) (*D. Leston*). IVORY COAST: 6 workers, 4 females, Banco Forest, Abidjan, 8.i.1963, no. A6 (*W. L. Brown*) (BMNH; MCZ, Cambridge; NM, Basle).

It is interesting to note the number of females present in the paratype series from Ivory Coast. As this caste is very poorly known in the African species of *Leptogenys* it is impossible to say whether this multigynous condition holds in any other species or is peculiar to members of the *sulcinoda*-group or merely to this one species.

L. mastax is a member of a small complex of species within the group centring on *sulcinoda* and including also *nuserra* and *occidentalis*. All share the characters of relatively short mandibles which close tightly against the clypeus and a strong sulcate sculpturation on the upper halves of the sides of the petiole. They are separated by the characters given in the key and their respective diagnoses.

Leptogenys nuserra sp. n.

DIAGNOSIS OF WORKER. Upper halves of sides of petiole sulcate. Dorsum of head densely punctate. Pronotum sculptured. Small species with relatively short scapes, HL < 1.00, SI < 140.

FURTHER DESCRIPTION. *Holotype worker.* TL 4.0, HL 0.90, HW 0.60, CI 67, SL 0.78, SI 130, PW 0.52, PH 0.52, PL 0.34, LPI 150, DPW 0.38, DPI 111.

Head not broadened in front of eyes, the sides feebly convex throughout their length. Maximum diameter of eye 0.20, in full-face view as long as the maximum width of the scape. Median lobe of clypeus triangular, broad and quite long. Mandibles relatively short, capable of closing tightly against the clypeus. Funicular segments 1–3 respectively 0.12, 0.14, 0.12. Petiole in profile high and narrow, the anterior and posterior faces virtually parallel but the

latter longer than the former so that the dorsal surface slopes upwards posteriorly. In dorsal view the node broadest posteriorly, narrowing in front, and the upper halves of the sides strongly convergent dorsally so that the dorsal surface proper is very narrow. Gaster constricted between first and second segments. All surfaces and appendages with numerous standing hairs. Dorsum of head densely but shallowly punctate, the sides and ventral surfaces unsculptured. Pronotal dorsum densely but finely reticulate or shagreened, the extreme posterior portion unsculptured and with finger-like projections radiating forwards. Remainder of dorsal alitrunk with scattered punctures and some very fine shagreening. Metapleuron with some fine striation and punctures, the former extending slightly onto the mesopleuron; otherwise sides of alitrunk unsculptured. Upper halves of sides of petiole longitudinally sulcate. Gaster smooth apart from minute hair-pits. Black, the legs, mandibles and scapes brown, the funiculi yellow-brown.

Paratypes workers. TL 3.5–4.1, HL 0.80–0.90, HW 0.56–0.62, CI 66–72, SL 0.66–0.78, SI 118–130, PW 0.46–0.54, PH 0.46–0.54, PL 0.30–0.36, LPI 150–159, DPW 0.32–0.38, DPI 100–112 (6 measured). Maximum diameter of eye 0.16–0.20; respective lengths of funicular segments 1–3 ca 0.12–0.14, 0.14–0.16, 0.12–0.14.

Paratype females. TL 3.6–3.7, HL 0.86–0.88, HW 0.58–0.60, CI 66–70, SL 0.72, SI 120–124, PW 0.51–0.52, PH 0.52, PL 0.26, LPI 200, DPW 0.42, DPI 161 (2 measured). Ocular diameter 0.20. Ergatoid, answering the description of the worker but with the petiole differently constructed as can be seen in the measurements given. The node in profile is strongly compressed antero-posteriorly and in dorsal view is relatively very broad. Gaster swollen; in the two females studied the height of the second segment in profile was 0.72–0.76 whilst its width in dorsal view was 0.74–0.76. In workers the height of this segment is 0.54–0.60 and the width 0.52–0.56.

Holotype worker, GHANA: Mt Atewa, 29.vii.1966, ant ecology sample 141E (*D. Leston*) (BMHN).

Paratypes. GHANA: 2 workers with same data as holotype; 1 female, Tafo, 22.vi.1966, ant ecology sample 45 (*D. Leston*); 1 worker, Tafo, 18.x.1966, ant ecology sample 335F (*D. Leston*); 1 worker, Mt Atewa, 8.viii.1969, pyrethrum knockdown sample A13/6 (*D. Leston*); 1 worker, Sajimasi, 25.vii.1969, on trunk (*D. Leston*). IVORY COAST: 1 worker, 1 female, Banco Forest, nr Abidjan, 8.i.1963, sample A11 (*W. L. Brown*); 5 workers, Banco Forest, nr Abidjan, i.1963, sample A (*W. L. Brown*) (BMNH; MCZ, Cambridge; NM, Basle.)

This species is most closely related to *mastax* but is smaller and the head is less strongly sculptured. It is the smallest of the complex of species immediately related to *sulcinoda* in which the upper halves of the sides of the petiole are longitudinally sulcate.

Leptogenys occidentalis Bernard stat. n.

(Text-fig. 13)

Leptogenys ferrarii subsp. *sulcinodis* Bernard, 1952 : 210, fig. 5D. Holotype worker, GUINEA: Ravin 1 du Mont To (st.B1 28) (*Lamotte*) (MNHN, Paris) [examined]. [Junior homonym of *sulcinoda* André, 1892 : 48.]

Leptogenys (Lobopelta) nitida subsp. *occidentalis* Bernard, 1952 : 211, fig. 5 F. Syntype workers, GUINEA: To Foret 21–2. B2 41 ravin 1 (*Lamotte*) (MNHN, Paris) [examined]. [Synonym of the above and hence valid name.]

Letogenys ferrarii subsp. *bernardi* Baroni Urbani, 1971 : 360. [Replacement name for *sulcinodis* Bernard.] **Syn. n.**

DIAGNOSIS OF WORKER. Upper halves of sides of petiole longitudinally sulcate. Pronotum unsculptured apart from hair-pits. Occipital margin in full-face view concave.

FURTHER DESCRIPTION. *Worker.* TL 4.5-4.6, HL 1.04-1.06, HW 0.72-0.76, CI 69-72, SL 0.94-0.98, SI 126-130, PW 0.62-0.66, PH 0.60-0.64, PL 0.40-0.42, LPI 150-155, DPW 0.42-0.44, DPI 100-105 (4 measured).

Head slightly broader in front than behind, the occipital margin broadly concave in full-face view. Maximum diameter of eye ca 0.20-0.24. Median lobe of clypeus broad, narrowly rounded anteriorly. Mandibles short, capable of closing against the clypeus. Length of funicular segments 1-3 respectively ca 0.17, 0.18, 0.16. Node of petiole in dorsal view as broad as or slightly broader than long, much broader behind than in front. Sides of petiole converging dorsally so that the dorsal surface is quite narrow. Petiole high and narrow in profile, the anterior and posterior faces vertical and more or less parallel but the former shorter than the latter. Gaster constricted between first and second segments. Dorsum of head with numerous small, shallow punctures, the spaces between them smooth and shining. Sides and ventral surface of head and sides and dorsum of alitrunk unsculptured apart from hair-pits; propodeal declivity with transverse rugae. Upper halves of sides of petiole strongly longitudinally sulcate. Gaster unsculptured apart from minute hair-pits. Black, with appendages brown.

The two Bernard names given above are straight synonyms despite the fact that he related one to *ferrarii*, an elongate-mandible form, and the other to *nitida*, a short-mandible form. The only reason which I can see for this procedure is that in Bernard's *sulcinodis* the mandibles are open, whilst in his *occidentalis* they are closed. Measurement of the mandibles shows that they are of equal dimensions in both but the fact that they are open in one and closed in the other gives the illusion that those of the former are actually longer than those of the latter.

This species is of course related to *ferrarii* and its allies and not to *nitida*. Its closest relative within the group appears to be *sulcinoda* but the two are separable by the shape of the occipital margin and the dimensions of the petiole, as noted in the key.

Leptogenys princeps sp. n.

(Text-fig. 26)

DIAGNOSIS OF WORKER. Head reticulate-punctate. Dorsal alitrunk completely sculptured. Node of petiole massive. Large species, HL > 1.20, PW > 0.75.

FURTHER DESCRIPTION. *Holotype worker.* TL 5.9, HL 1.26, HW 0.90, CI 71, SL 1.30, SI 144, PW 0.82, PH 0.86, PL 0.62, LPI 138, DPW 0.68, DPI 109.

Head slightly broadened in front of the eyes, the sides of the head feebly convex, the occipital margin in full-face view feebly concave. Maximum diameter of eye 0.32, greater than the maximum width of the scape. Eyes with a weak circumocular impression on their inner and posterior margins. Respective lengths of funicular segments 1-3 ca 0.18, 0.26, 0.24. Node of petiole massively constructed, in profile nearly as large as the first gastral segment. Posterior face of node approximately vertical, meeting the dorsal surface in an acute angle which slightly overhangs the posterior face. In dorsal view the nodes as long as the first gastral tergite, broader behind than in front. Hairs present on all surfaces of head, body and appendages. Dorsum of head coarsely reticulate-punctate, the sides and ventral surface unsculptured apart from a number of hair-pits. Alitrunk everywhere finely rugulose, the dorsal alitrunk and sides of the pronotum also with scattered large punctures. Propodeal declivity only with transverse rugulae. Upper halves of sides of petiole finely punctate with some larger punctures, the lower halves smooth and shiny. Posterior one-quarter of the sides

of the node with a vertical series of short, coarse, longitudinal sulci. Gaster unsculptured apart from small hair-pits, smooth and shining. Colour dark brown, the mandibles, antennae and legs lighter, the node black.

Holotype worker, GHANA: Mt Atewa, 4.viii.1966 (*D. Leston*) (BMNH).

This is one of the larger species of the group and its size and massive petiole node make it easy to identify.

Leptogenys ravida sp. n.

(Text-fig. 10)

DIAGNOSIS OF WORKER. Eyes relatively small, their maximum diameter about equal to the length of the third funicular segment. Median clypeal lobe narrow, short and acute.

FURTHER DESCRIPTION. *Holotype worker*. TL 5.1, HL 1.08, HW 0.78, CI 72, SL 1.02, SI 130, PW 0.66, PH 0.64, PL 0.48, LPI 133, DPW 0.46, DPI 96.

Head broader in front than behind, the sides feebly convex and diverging anteriorly throughout their length. Occipital margin in full-face view broadly and very shallowly concave. Eyes relatively small for a member of this group, maximum diameter ca 0.18, about equal in length to the third funicular segment and only very slightly larger than the maximum width of the scape (ca 0.14). Median lobe of clypeus short, narrow and acute. Mandibles elongate and narrow, not closing tightly against the clypeus. Node of petiole with the anterior and posterior faces approximately vertical in profile, but the former shorter than the latter so that the dorsal surface slopes upwards posteriorly. Dorsum of head smooth and shining, unsculptured apart from a number of minute, widely scattered hair-pits. Dorsal alitrunk similar except that the hair-pits are much larger and the extreme posterior portion of the propodeum has a few faint, transverse striae. Propodeal declivity rugose. Sides of pronotum unsculptured apart from scattered pits. Mesopleuron with a few faint rugulae and extensive smooth, shining areas; metapleuron and sides of propodeum minutely rugulose. Node of petiole with a few faint striae on the upper halves of the sides. Gaster smooth and shiny apart from minute hair-pits. Black, shining, the appendages brown.

Holotype worker, ZAIRE: ('Belg. Congo' on data label) Mulungu Res. Sta., 1650 m, 28.iv.1948 (*A. Emerson*), 'Ants from mound of *Odontotermes patruus* (Sjostedt)' (MCZ, Cambridge).

Leptogenys sulcinoda (André)

(Text-fig. 14)

Lobopelta sulcinoda André, 1892 : 48. Holotype worker, GABON (*Mocquerys*) (MNHN, Paris) [examined].

Leptogenys (Lobopelta) sulcinoda (André); Emery, 1911 : 102.

DIAGNOSIS OF WORKER. Upper halves of sides of petiole sulcate. Pronotum unsculptured apart from hair-pits. Occipital margin in full-face view feebly convex.

FURTHER DESCRIPTION. *Worker*. TL 4.6, HL 1.02, HW 0.72, CI 70, SL 0.90, SI 125, PW 0.58, PH 0.64, PL 0.48, LPI 133, DPW 0.46, DPI 96.

Head only slightly broadened anteriorly, the occipital margin feebly convex. Eyes large, maximum diameter 0.24. Median lobe of clypeus broad and broadly rounded anteriorly. Mandibles short, capable of closing tightly against the clypeus. Petiole in profile with the posterior face very weakly sinuate, much longer than the anterior face so that the dorsal surface slopes upwards posteriorly. Anterior face of petiole grades into dorsum through a broad convexity; the angle separating dorsum and posterior face more acute though still

rounded. In dorsal view the node slightly longer than broad, broadest posteriorly. Upper halves of sides of petiole node converge dorsally so that the dorsal surface is very narrow. Gaster strongly constricted between first and second segment. Head with numerous fine, shallow punctures, separated by shining interspaces; sides and ventral surface unsculptured. Alitrunk mostly unsculptured apart from hair-pits but the declivity of the propodeum has a few weak transverse rugae, and a few weak rugae or vestiges of such are present upon the propodeum and metapleuron. Upper halves of sides of petiole strongly longitudinally sulcate. Gaster unsculptured apart from minute hair-pits. Colour black, the appendages brown.

This species is apparently only known from the original collection of a single specimen. It is closest related to *occidentalis* but separated from it by the possession of a feebly convex occipital margin, and by the other characters noted above and in the key. Two other species are known in which the upper halves of the sides of the petiole are longitudinally sulcate, *mastax* and *nuserra*, but in both of these species the pronotal dorsum is strongly sculptured.

Leptogenys terroni sp. n.

DIAGNOSIS OF WORKER. Dorsum of head and alitrunk covered with dense sculpturation. Large species, HL ca 1.48, SL ca 1.62.

FURTHER DESCRIPTION. *Holotype worker*. TL 7.8, HL 1.48, HW 1.18, CI 80, SL 1.62, SI 137, PW 0.98, PH 0.90 PL 0.74, LPI 121, DPW 0.66, DPI 90.

Head much broader in front than behind, the width across the clypeus considerably greater than across the eyes. Sides of head more or less straight, diverging strongly from back to front. Eyes large, maximum diameter 0.42, much greater than the maximum width of the scape and with a distinct circumocular impression above, in front of and behind the eye, but not below. Clypeus with a prominent, truncated median lobe. Mandibular blades very long, only feebly curved along their length, increasing slightly in width from base to apex. Funicular segments 1-3 ca 0.30, 0.32, 0.18 respectively. Metanotal groove impressed and crossribbed. Petiole with the upper halves of the sides converging dorsally so that the true dorsal surface is a narrow, longitudinal strip. Gaster strongly impressed between first and second segments. All surfaces of head, body and appendages with numerous standing hairs. Dorsum of head, especially between the eyes, finely and closely reticulate-rugulose, the spaces between the rugulae with numerous small punctures. Pronotum and mesonotum covered with a dense, fine reticulation and with scattered hair-pits. Propodeum and upper halves of sides of petiole similarly sculptured but also with larger rugae. Sides of pronotum as dorsum, the pleurae rugose. Legs, gaster and lower halves of sides of petiole smooth and shining, with hair-pits but otherwise unsculptured. Colour black, the gaster and appendages brown, the former darker in colour than the latter.

Holotype worker, CAMEROUN: no. 1519 (no further data) (*G. Terron*) (BMNH).

This is the largest and one of the most distinctive species yet known in the *sulcinoda*-group. Its large size and characteristic sculpturation render it easily distinguishable from other members of the group.

Leptogenys trilobata Santschi

(Text-fig. 11)

Leptogenys trilobatus Santschi, 1924 : 196, fig. 1. *Holotype worker*, ZAIRE: Tschela, 2.xi.1920 (*H. Schoutedden*) (MRAC, Tervuren) [examined].

DIAGNOSIS OF WORKER. Dorsum of head rugose, dorsum of alitrunk not densely sculptured, mostly shining. Median clypeal lobe truncated apically.

FURTHER DESCRIPTION. *Worker*. TL 5.4–5.6, HL 1.02–1.10, HW 0.76–0.84, CI 75–76, SL 0.86–0.94, SI 112–113, PW 0.62–0.68, PH 0.54–0.60, PL 0.56–0.62, LPI 96–98, DPW 0.50–0.52, DPI 84–89 (2 measured).

Head broader in front than behind. Maximum diameter of eyes 0.22–0.24, greater than the maximum width of the scape. A weak circumocular impression present on inner and posterior margins of eyes. Median lobe of clypeus strongly prominent, with almost parallel sides and a broadly arcuate, truncated apex. Mandibles long and narrow, not closing against the clypeus. Respective lengths of funicular segments 2–3 ca 0.16–0.18, 0.14–0.16. Metanotal groove weakly cross-ribbed. Node of petiole massive; in dorsal view longer than wide, widest posteriorly; in profile very nearly as long as high. Gaster constricted between first and second segments. Dorsum of head rugose, with numerous minute punctures; the median strip of the ventral surface unsculptured. Dorsal alitrunk with scattered foveolate punctures, the pronotum with a few weak, rounded rugae, the propodeum also with a few small punctures. Meso- and metapleurae striate, with punctures between the striae. Gaster smooth and shining. Standing hairs numerous on all surfaces. Black with the appendages light brown.

MATERIAL EXAMINED.

CAMEROUN: Yolé Massif, Kala (*G. Terron*)

THE *ATTENUATA*-GROUP

(Text-figs 22, 29, 30)

Mandibles short, closing tightly against the clypeus. Eyes medium to large, their maximum diameter greater than the maximum width of the antennal scape. Second funicular segment distinctly longer than the third. Head slightly or not broadened anteriorly. Node of petiole in dorsal view much longer than broad. Sculpture only of fine punctures dorsally from which hairs arise, with large shining spaces between the punctures. Gaster constricted between first and second segments. Clypeus without a prominent median lobe, without a fringing lamella.

Of the four species placed in this small group *bubastis* and *crassinoda* are certainly closely related, but the remaining species, *attenuata* and *ergatogyna*, are very different. However, in view of the characters above it is probably best to leave them in one group until the genus as a whole is better understood.

In the four species, *crassinoda* and *attenuata* are known only from South Africa whilst *bubastis* is known only from Cameroun. The last species, *ergatogyna*, is more widely distributed, having been recorded from Ghana, Uganda and Zaire, and appears to be strictly a forest species.

Three other species referable to this group and related either to *attenuata* or *crassinoda* are known from the Malagasy Region.

Leptogenys attenuata (F. Smith)

(Text-fig. 29)

Ponera attenuata F. Smith, 1858 : 91. LECTOTYPE and paralectotype workers, by present designation, SOUTH AFRICA: Cape of Good Hope, no. 1490 (*Drege*) (UM, Oxford; BMNH) [examined].

Lobopelta attenuata (F. Smith); Roger, 1863 : 19.

Leptogenys (*Lobopelta*) *jaegerskjoeldi* Santschi, 1914b : 9. Syntype workers, SOUTH AFRICA : Natal, Richmond, 24.iii.1905 (*I. Trägårdh*) NM, Basle) [examined]. [Synonymy by Arnold, 1926 : 210.]

Leptogenys jägerskiöldi Santschi; Santschi, 1917 : 297. [Misspelling.]

DIAGNOSIS OF WORKER. Petiole in dorsal view elongate and strongly compressed from side to side, much narrower anteriorly than posteriorly. Body often with bluish or violet reflections. Antennal scapes moderately long, SI > 175.

FURTHER DESCRIPTION. *Worker*. TL 7.5–7.8, HL 1.50–1.62, HW 0.94–1.02, CI 59–63, SL 1.72–1.98, SI 183–194, PW 0.84–0.94, PH 0.66–0.80, PL 0.76–0.88, LPI 86–91, DPW 0.38–0.46, DPI 50–53 (8 measured).

Head elongate, quite narrow, broadest across the eyes which are situated approximately at the midlength of the sides of the head. Occipital margin concave in full-face view. Eyes large, maximum diameter ca 0.36–0.42, greater than the maximum width of the scape. Clypeus triangular, the mandibles closing tightly against it. Respective lengths of funicular segments 1–3 ca 0.26–0.28, 0.46–0.48, 0.36–0.40. Metanotal groove impressed but not cross-ribbed. Node of petiole in dorsal view elongate, strongly narrowed anteriorly, much broader behind than in front. In profile the anterior and dorsal faces confluent through a broad curve. Gastral constriction between first and second segments distinct. Sculpture lacking except on the mandibles where a few very fine striae are usually present. All surfaces of body with standing hairs. Colour black or blackish brown, usually with bluish or violet reflections. Legs, mandibles and funiculi lighter.

This quite distinctive species, the male of which was described by Arnold (1915), appears to be restricted to South Africa. Some apparently closely related forms are known from the Oriental and Indo-Australian Regions, such as *peuqueti* André and *assamensis* Forel, and these species resemble *attenuata* more closely than any species present in the Ethiopian Region.

MATERIAL EXAMINED.

SOUTH AFRICA; E. Cape Prov., Katberg (*R. E. Turner*); Grahamstown (*W. L. Brown*); E. Cape Prov., Alexandria (*W. L. Brown*); Natal, Durban (*G. Arnold*); Durban (*H. B. Marley*); Durban (*C. B. Cooper*); W. Grahamstown (*F. Jacot-Guillarmod*); Cape Prov., Knysna (*B. Malkin*).

Leptogenys bubastis sp. n.

DIAGNOSIS OF WORKER. Propodeal dorsum without a transverse impression anteriorly but with scattered large pits. Petiole node in dorsal view not strongly compressed from side to side. Scapes relatively short, SI < 165.

FURTHER DESCRIPTION. *Holotype worker*. TL 7.0, HL 1.42, HW 0.98, CI 69, SL 1.50, SI 153, PW 0.86, PH 0.72, PL 0.70, LPI 103, DPW 0.46, DPI 66.

Head broadest across the eyes, not much broader in front than behind, the sides feebly convex. Maximum diameter of eye ca 0.30, greater than the maximum width of the scape. Clypeus broadly triangular, the mandibles closing tightly against it. Funicular segments 1–3 ca 0.26, 0.42, 0.30 respectively. Metanotal groove a narrow, incised line, not cross-ribbed. Propodeal dorsum relatively much longer than in the related *crassinoda* (see key, couplet 49). Node of petiole in dorsal view longer than broad, narrowing anteriorly but the sides not strongly compressed. Gaster constricted strongly between first and second segments. Dorsal surfaces of head and body with short, standing hairs. Head with numerous minute punctures from which hairs arise, the pronotum with very few such pits, but the mesonotum and

propodeum with a number of large pits. First and second gastral tergites abundantly supplied with distinct hair-pits. Propodeal declivity not transversely rugose. Sides of alitrunk with some cross-ribbing or rugosity at the suture lines and on the bulla of the metapleural glands; otherwise the body smooth. Colour black, the appendages brown.

Holotype worker, CAMEROUN: series MZ (*G. Terron*) (BMNH).

Most closely related to *crassinoda*; the differences between the two are given under that species and in the key.

Leptogenys crassinoda Arnold stat. n.

(Text-fig. 30)

Leptogenys attenuata var. *crassinoda* Arnold, 1926 : 210. Syntype workers, SOUTH AFRICA: East London (*Rattray*) (BMNH) [examined].

DIAGNOSIS OF WORKER. Propodeal dorsum without a transverse impression anteriorly, with scattered large pits. Petiole node in dorsal view not strongly compressed from side to side. Antennal scapes relatively short, SI < 165.

FURTHER DESCRIPTION. *Worker*. TL 6.2–7.2, HL 1.38–1.42, HW 0.94–1.00, CI 68–70, SL 1.48–1.52, SI 152–157, PW 0.82–0.86, PH 0.70–0.72, PL 0.64–0.66, LPI 109–110, DPW 0.40–0.44, DPI 60–68 (2 measured).

Head broadest across the eyes, not markedly broader in front than behind. Occipital margin broadly but shallowly concave in full-face view. Maximum diameter of eye ca 0.28–0.30, greater than the maximum width of the antennal scape. Clypeus triangular, the mandibles closing tightly against it. Metanotal groove impressed but not cross-ribbed. Node of petiole in dorsal view elongate, broadest behind and narrowing slightly anteriorly. Constriction between first and second gastral segments distinct. Body unsculptured. Standing hairs present upon all surfaces. Colour black, the appendages brown or yellow-brown.

Arnold originally described this species as a variety of *attenuata* but it is smaller, with a broader head, smaller eyes, shorter scapes and a shorter, thicker petiole. As far as can be ascertained *crassinoda* is still only known from the type-collection.

The closest related species to *crassinoda* is *bubastis*, which it closely resembles. However, in *bubastis* the mesonotum and propodeum have numerous scattered, large punctures or pits which are absent from *crassinoda*, and the propodeal dorsum is relatively much longer in *bubastis*, as is noted in the key.

Leptogenys ergatogyna Wheeler

(Text-fig. 22)

Leptogenys (Lobopelta) ergatogyna Wheeler, 1922 : 95, fig. 20. Holotype female, ZAIRE: Medje (*Lang & Chapin*) (AMNH, New York) [examined].

Leptogenys (Lobopelta) cursor Arnold, 1954 : 293, fig. 4. Holotype worker, UGANDA: Zika Forest, near Entebbe, 18.v.1952 (*G. Arnold*) (NM, Bulawayo) [examined]. **Syn. n.**

DIAGNOSIS OF WORKER. Mandibles massively developed, very broad. Propodeal dorsum with a broad, transverse impression anteriorly and a longitudinal groove which is most distinct posteriorly. Antennal scapes very long, SI > 200.

FURTHER DESCRIPTION. *Worker*. TL 8.0–8.4, HL 1.60–1.62, HW 0.98–1.02, CI 61–62, SL 2.34–2.44, SI 238–244, PW 0.96–1.02, PH 0.76–0.80, PL 0.71–0.72, LPI 106–111, DPW 0.48–0.50, DPI 66–69 (4 measured).

Head elongate and narrow, somewhat broader in front than behind; occipital margin short and only extremely weakly concave. Eyes large, maximum diameter ca 0.40–0.42, the eyes situated just in front of the midlength of the sides of the head. Clypeus triangular. Mandibles massive, broad and heavy, their basal borders closing tightly against the clypeus. Apical (masticatory) margin very long, meeting the basal margin through a broad curve. A single preapical tooth present, close to the apical. Antennal scapes very long; lengths of funicular segments 1–3 respectively ca 0.30–0.34, 0.60–0.64, 0.46–0.50. Metanotal groove present but not cross-ribbed. Propodeal dorsum with a longitudinal groove, most distinct posteriorly, and also with a transverse impression anteriorly, just posterior to the metanotal groove. Node of petiole in dorsal view elongate, broadest behind and narrowing slightly anteriorly. Constriction between first and second gastral segments distinct. Meso-metapleural suture cross-ribbed, otherwise body unsculptured apart from hair-pits, which are abundant on the head. Standing hairs present on all dorsal surfaces; pubescence quite dense on dorsum of head and on legs. Colour black, the appendages brown.

Female. TL 8.2, HL 1.62, HW 1.00, CI 62, SL 2.26, SI 226, PW 1.02, PH 0.84, PL 0.72, LPI 116, DPW 0.52, DPI 72.

Head similar to that of worker but with three ocelli, of which the median (anterior) is the best developed. Scapes relatively slightly shorter than in worker but eyes about the same size, maximum diameter ca 0.42. Alitrunk with developed flight sclerites but wings apparently never developed. Parapsidal furrows present; posterior arm of notauli present, the anterior arms absent. Node of petiole slightly higher and broader than in worker, the gaster swollen beyond the size of the worker. In the female the height of the second segment in profile is 1.20 whilst in the worker it is 1.04, and the dorsal width of the second segment is 1.10 in the female, 0.95 in the worker. The female has some fine, transverse striation across the anterior portion or covering all of the propodeal dorsum which is not present in the worker, and lacks the transverse propodeal impression present in the worker, but otherwise the two are similar.

The association of the worker and female castes of this species described respectively as *cursor* and *ergatogyna*, was permitted by a series collected at Tafo, Ghana by D. Leston, which contained a number of workers and a single female. The holotype of *ergatogyna* and the female in the Ghana series are similar in most respects but the former is more strongly sculptured. The fine punctures of the head are rather more dense and are also abundant on the pronotum, which in the case of the Ghana female is mostly smooth and shining. Transverse striae are restricted to the anterior half of the propodeal dorsum in the Ghana specimen whilst in the holotype of *ergatogyna* they occur on the entirety of the segment.

MATERIAL EXAMINED.

GHANA: Tafo (*D. Leston*); Mt Atewa (*D. Leston*); Nkwantanan (*D. Leston*). CAMEROUN: Ototomo (*G. Terron*).

THE GUINEENSIS-GROUP

(Text-figs 16, 23, 28)

Mandibles short, closing tightly against the clypeus. Eyes small or minute, their maximum diameter always less than the maximum width of the antennal scape. Second funicular segment as long as or shorter than the third. Head only slightly or not broadened anteriorly. Sculpture usually only of fine punctures dorsally. Gaster not or only very feebly constricted between the first and second segments. Standing hairs absent from dorsum of propodeum, petiole and first and second gastral tergites.

The four related species forming this group are presently known only from West Africa; three of the species are forest inhabitants whilst the fourth (*microps*) is a savannah species.

Leptogenys guineensis Santschi

(Text-fig. 16)

Leptogenys (Lobopelta) guineensis Santschi, 1914a : 329, fig. 14. Syntype workers, GUINEA: Mamou (*F. Silvestri*) (NM, Basle) [examined].

DIAGNOSIS OF WORKER. Apex of mandible with two teeth. Larger species, HL > 0.88. Petiole in profile not a dorsally tapered, thick scale.

FURTHER DESCRIPTION. *Worker*. TL 4.3–4.5, HL 0.92–0.96, HW 0.68–0.70, CI 73–74, SL 0.80–0.82, SI 117–118, PW 0.54–0.56, PH 0.52, PL 0.32–0.36, LPI 145–160, DPW 0.36–0.38, DPI 105–112 (6 measured).

Head not broadened anteriorly, broadest just behind the eyes, the sides shallowly convex. Eyes small, maximum diameter ca 0.08; in full-face view their maximum diameter less than the greatest width of the scape. Second funicular segment usually slightly shorter than the third, sometimes the same length; the relative lengths of segments 1–3 ca 0.12–0.14, 0.10–0.12, 0.12. Mandibles short, with a single preapical tooth and closing tightly against the clypeus. Metanotal groove impressed and with a very fine cross-ribbing so that the base of the groove appears to be traversed by a row of punctures. Node of petiole high and narrow in profile, with a slightly convex anterior face and a virtually straight, sloping posterior face. Gaster only very weakly impressed between first and second segments. Body unsculptured apart from transverse rugae on propodeal declivity and cross-ribbing on the meso-metapleural suture. Short, standing hairs absent from propodeum and first two gastral tergites. Colour brown, glossy, the appendages lighter.

This species is very closely related to *testacea*, and further collections may prove them to be inseparable. However, in the material examined during the course of this study specimens of *guineensis* have consistently been larger and have lacked the third (middle) tooth on the mandibular apex which is characteristic of *testacea*. Another feature which appears to be typical of *guineensis* is the presence on the anterior portion of the median clypeal lobe of a yellow-coloured patch which is usually about the same colour as the mandibles. Two long setae with distinct black pits project from the upper portion of this area. In *testacea* this area is slightly lighter in colour but does not form a strong contrast with its surroundings as it does in *guineensis*.

MATERIAL EXAMINED.

GHANA: Mt Atewa (*C. A. Collingwood*); Mt Atewa (*D. Leston*); Tafo (*D. Leston*).

Leptogenys microps sp. n.

DIAGNOSIS OF WORKER. Apex of mandible with two teeth. Minute species, HL < 0.70; eyes minute, maximum diameter < 0.05.

FURTHER DESCRIPTION. *Holotype worker*. TL 2.7, HL 0.66, HW 0.48, CI 73, SL 0.50, SI 104, PW 0.38, PH 0.34, PL 0.28, LPI 121, DPW 0.22, DPI 78.

Head not broader in front than behind, broadest at about its midlength, the sides feebly convex. Occipital margin very weakly concave medially in full-face view. Clypeus with a

relatively short, bluntly triangular median lobe, the apex of which is rounded. Mandibles short, closing tightly against the clypeus, the inner margins of the blades convex, the outer slightly concave in full-face view. Eyes minute, maximum diameter 0.04, much less than the maximum width of the scape, with very few facets. Funiculus with segments 1-3 ca 0.10, 0.06, 0.07 respectively, the second funicular segment very nearly as broad as long. Petiole in profile with the anterior face slightly convex, rounding into the dorsal surface; the latter meeting the almost straight posterior face in a more acute angle. Body of node inclined forward so that the anterior face is much shorter than the posterior and so that when the ventral surface is horizontal the anterior and posterior faces slope anteriorly. Gaster weakly constricted between first and second segments. Standing hairs absent from dorsum of propodeum, petiole and first two gastral tergites, which do, however, have a strongly adpressed pubescence. Pronotum with a pair of long, erect hairs anteriorly and with shorter standing hairs and pubescence. Dorsum of head with minute, faint superficial punctures. Dorsal alitrunk with scattered punctures, larger than those on the head and more distinct, most obvious on the propodeum. Propodeal declivity with a few fine, transverse striae. Gastral tergites with scattered minute punctures. Colour uniform dull yellow.

Paratype workers. TL 2.7-2.9, HL 0.64-0.66, HW 0.48-0.50, CI 73-78, SL 0.50-0.52, SI 104-108, PW 0.38, PH 0.34-0.36, PL 0.28, LPI 121-128, DPW 0.22-0.24, DPI 78-86 (2 measured).

As holotype, with eyes the same size, but in one the occipital margin in full-face view is nearly straight and the punctures of the propodeal dorsum are shallower and less well defined.

Holotype worker, IVORY COAST: Lamto (Toumodi), 15.ix.1965, AA129 (probably collected by J. Léveux) (MCZ, Cambridge).

Paratypes. 1 worker with same data as holotype, and 1 worker from the same locality but dated 10.ix.1965, AA 124 (BMNH; MCZ, Cambridge).

This minute species is the smallest of the *guineensis*-group and one of the smallest species known of the genus. In some ways it is convergent with the very small species of the *nitida*-group (*khaura*, *cryptica*, *stygia*) but these forms have numerous standing hairs on the propodeum, petiole and gaster, absent from *microps*.

Leptogenys spandax sp. n.

(Text-fig. 28)

DIAGNOSIS OF WORKER. Apex of mandible with two teeth. Larger species, HL > 1.00. Petiole in profile a thick scale, tapering dorsally.

FURTHER DESCRIPTION. *Holotype.* TL 6.8, HL 1.38, HW 0.98, CI 71, SL 1.46, SI 149, PW 0.82, PH 0.82, PL 0.60, LPI 137, DPW 0.54, DPI 90.

Occipital margin feebly convex, sides of head very weakly convex and slightly diverging anteriorly so that the front of the head is somewhat wider than the back. Eyes small, maximum diameter ca 0.14, failing to break the outline of the sides of the head in full-face view. Maximum diameter of eye distinctly less than maximum width of scape. Clypeus with a broadly triangular median lobe. Mandibles short, closing tightly against the clypeus, their inner margins convex, outer margins slightly concave. Second and third funicular segments of equal length, ca 0.24. Metanotal groove impressed and weakly cross-ribbed. In profile the propodeal declivity with a short tooth on each side, projecting just above the bulla of the metapleural glands. Node of petiole in profile a thick scale, tapering strongly in its upper half. Anterior face almost vertical, posterior face sloping strongly anteriorly, the dorsum very short. In dorsal view the node short and broad, with a narrow, wide dorsal surface, a slightly convex anterior and slightly concave posterior face. Gaster not constricted between first and second segments. Standing hairs absent from dorsal surfaces of head, alitrunk, gaster and appendages, present only around

the mouth and gastral apex. Dorsum of head finely punctate. Pronotum similarly sculptured but the punctures larger and more dispersed, with reticulate sculpture between them. Propodeal dorsum finely rugulose, the declivity very coarsely transversely rugose. Sides of propodeum and metapleuron rugose, mesopleuron with patches of rather effaced sculpture, mostly smooth and shining. First gastral tergite with numerous minute punctures. Brown, the legs, antennae and mandibles yellow-brown.

Paratype worker. As holotype but with HL 1.36, HW 0.98, CI 72, SL 1.44, SI 1.47, PW 0.78, PH 0.78, PL 0.58, LPI 134, DPW 0.54, DPI 93.

Holotype worker, GHANA: Tafo, 24.ix.1966, ant ecology sample 282E (*D. Leston*) (BMNH).

Paratype. 1 worker with same data as holotype (MCZ, Cambridge).

Leptogenys testacea (Donisthorpe)

(Text-fig. 23)

Microbolbos testaceus Donisthorpe, 1948: 170. Holotype and paratype workers, GHANA: Eastern Region, New Tafo, vii. 1945, no. F463 (*Strickland*) (BMNH) [examined].

Leptogenys testacea (Donisthorpe); Wilson, 1955: 136.

DIAGNOSIS OF WORKER. Apex of mandible with three teeth. Smaller species, HL <0.88

FURTHER DESCRIPTION. *Worker.* TL 3.5-3.7, HL 0.80-0.84, HW 0.60-0.62, CI 73-76, SL 0.70-0.72, SI 1.16-1.20, PW 0.46-0.48, PH 0.44-0.50, PL 0.30-0.32, LPI 140-156, DPW 0.32-0.36, DPI 100-113 (8 measured).

Maximum width of head at about the midlength of the sides, behind the eyes. Eyes small, maximum diameter ca 0.08; in full-face view the maximum diameter of the eye less than the greatest width of the scape. Relative lengths of funicular segments 1-3 ca 0.12, 0.10, 0.10. Mandibles short, closing tightly against the triangular clypeus. Mandibles with three teeth, the apical and two preapical. The middle tooth of the three (i.e. first preapical) is the smallest and in some specimens appears to be considerably worn down. Metanotal groove impressed and with very fine cross-ribbing, appearing as a row of punctures traversing the base of the groove. Node of petiole high and narrow in profile; the gaster not constricted between the first and second segments. Unsculptured apart from some transverse rugae on the propodeal declivity and cross-ribbing on the meso-metapleural suture. Short, standing hairs absent from the propodeum and first two gastral tergites. Colour light brown, shining, the legs and antennae lighter.

This small, soil-inhabiting species is known at present only from the type-series. It is very closely related to *guineensis* and a discussion of the two is given under that species.

Wilson (1955: 136) first pointed out that the mandible was armed with three teeth and stated that the surface of the body was 'heavily shagreened, completely opaque.' This effect was due to a layer of very fine dirt (mud?) on the surface of the specimens. When cleaned they are mostly smooth and shining.

THE HAVILANDI-GROUP

Mandibles short, closing tightly against the clypeus. Eyes medium, their maximum diameter greater than the maximum width of the scape. Second funicular segment longer than the third. Sculpture of dorsal head and alitrunk of dense rugulation or punctures. Gaster

constricted between first and second segments. Clypeus with a fringing lamella, which may be very narrow.

The four species forming this compact group appear to be restricted to the territories of South Africa and Rhodesia. All are of medium size, are stoutly built and strongly sculptured.

Leptogenys arnoldi Forel

Leptogenys (Lobopelta) arnoldi Forel, 1913a : 110. Syntype workers, males, RHODESIA: Plumtree (*Arnold*) (MRAC, Tervuren; MHN, Geneva) [examined].

DIAGNOSIS OF WORKER. First and second gastral tergites unsculptured. Antennal scapes shorter, SI < 140. Fringing lamella of clypeus indistinct. Maximum diameter of eye 0.34 or more.

FURTHER DESCRIPTION. *Worker*. TL 5.9–6.8, HL 1.30–1.44, HW 0.94–1.02, CI 66–72, SL 1.18–1.32, SI 125–133, PW 0.78–0.86, PH 0.70–0.76, PL 0.52–0.54, LPI 135–146, DPW 0.46–0.56, DPI 90–104 (6 measured).

Head slightly broader in front than behind, the occipital margin broad and very weakly convex, the sides convex. Maximum diameter of eyes ca 0.34–0.36, their length in full-face view greater than the maximum diameter of the slightly flattened scapes. Clypeus large, broadly triangular, with a very narrow, indistinct lamelliform anterior margin. Mandibles short and broad, with a single small preapical tooth; closing tightly against the clypeus. Second funicular segment elongate, lengths of segments 1–3 respectively ca 0.20–0.24, 0.30–0.32, 0.20–0.22. Metanotal groove deep but not cross-ribbed. Petiole in profile high and quite narrow, the anterior and posterior faces almost parallel, rounding into the slightly convex dorsum. Gaster strongly constricted between first and second segments. Mandibles smooth and shining. Dorsum of head with small punctures, densest between the eyes, tending to become more sparse medially and also posteriorly. Pronotum merely roughened or finely, densely punctate, but usually with a smooth, shining area posteromedially which often extends anteriorly on the disc and often has a number of finger-like projections radiating from the median area. Mesonotum as pronotum, again with some smooth areas. Propodeum strongly and densely punctate or roughened, the declivity transversely rugose. Gaster smooth and shining. Standing hairs present on all surfaces. Pubescence quite dense on head and alitrunk, sparse on gaster. Colour dark brown or black, the legs, mandibles and antennae light or dark brown.

The characters given in the diagnosis above are sufficient to differentiate *arnoldi* from the remaining species of the group. The female of this species was described by Arnold (1915), but this specimen has not been examined during the course of the present study.

Leptogenys furtiva Arnold stat. n.

Leptogenys havilandi race *furtiva* Arnold, 1926 : 209. Syntype workers, RHODESIA: Bulawayo, 2.i.1915 (*G. Arnold*) (BMNH) [examined].

DIAGNOSIS OF WORKER. First and second gastral tergites sculptured, reticulate-punctate or granular. Antennal scapes longer, SI > 140. Fringing lamella of clypeus distinct, broad and often opaque.

FURTHER DESCRIPTION. *Worker*. TL 6.5–6.8, HL 1.30–1.40, HW 0.92–1.00, CI 70–72, SL 1.38–1.48, SI 147–150, PW 0.80–0.86, PH 0.74–0.80, PL 0.56–0.60, LPI 130–133, DPW 0.52–0.58, DPI 92–97 (6 measured).

Head only very slightly broader in front than behind, the sides very feebly convex, almost

straight. Frontal groove short, not extending to level of posterior margins of eyes. Eyes medium, maximum diameter ca 0.28–0.32. Clypeus broad, with a distinct and usually opaque, broad fringing lamella on the anterior margin. Mandibles short, closing tightly against the clypeus. Respective lengths of funicular segments 1–3 ca 0.22–0.24, 0.32–0.36, 0.24–0.26. Metanotal groove deeply impressed; gaster very strongly constricted between first and second segments. All surfaces of body with numerous standing hairs. Dorsum of head, alitrunk and first two gastral tergites very finely and very densely reticulate-punctate or punctulate, the individual punctures so small and closely packed that the surfaces appear coarsely granular. Propodeal dorsum also with a few weak rugulae. Pleurae and sides of propodeum more coarsely sculptured, with distinct rugae.

This species is separated from others of the group by its strongly sculptured gaster, but in all other respects it is very close to *havilandi*. In the original description Arnold (1926) noted that the workers were carrying termites in their jaws.

Leptogenys havilandi Forel

Leptogenys (Lobopelta) havilandi Forel, 1901a : 332. Holotype worker, SOUTH AFRICA: Natal (*Haviland*) (MHN, Geneva) [examined].

DIAGNOSIS OF WORKER. First and second gastral tergites unsculptured. Antennal scapes longer, SI > 140. Fringing lamella of clypeus distinct, broad. Maximum diameter of eye < 0.34.

FURTHER DESCRIPTION. *Worker*. TL 6.7–7.2, HL 1.32–1.42, HW 0.96–1.00, CI 70–73, SL 1.40–1.60, SI 146–160, PW 0.80–0.88, PH 0.76–0.80, PL 0.60–0.62, LPI 126–130, DPW 0.50–0.56, DPI 83–91 (3 measured).

Head only very slightly broader in front than behind, the sides feebly convex, almost straight. Frontal groove distinct, extending to the level of the posterior margin of the eyes or further. Maximum diameter of eyes ca 0.26–0.30. Clypeus broadly triangular and rounded, with a distinct fringing lamella on the anterior margin. Mandibles closing tightly against clypeus. Respective lengths of funicular segments 1–3 ca 0.22–0.24, 0.34–0.38, 0.26–0.28. Metanotal groove deeply impressed; gaster strongly constricted between the first and second segments. All surfaces of body with numerous standing hairs. Dorsum of head reticulate-punctate. Pronotum with small, crowded rugulae and some puncturation, similarly the mesonotum and propodeal dorsum but on the latter the rugulae tend to be coarser. Sides of propodeum and pleurae coarsely rugose, the pronotum finely sculptured. First and second gastral tergites unsculptured apart from hair-pits.

Most closely related to *furtiva* and *peringueyi*, from which it is separated by details of sculpturation; *havilandi* may be found to be inseparable from them when more collections have been made. At present *havilandi* represents a mid-point between the very heavily sculptured *furtiva* and the lightly sculptured *peringueyi*, but these three forms may well be different expressions of a single variable species.

Leptogenys peringueyi Forel

Leptogenys (Lobopelta) havilandi st. *peringueyi* Forel, 1913c : 210. Holotype worker, SOUTH AFRICA: Cape Prov., Table Mountain (*L. Peringuey*) (MHN, Geneva) [examined].
Leptogenys (Lobopelta) peringueyi Forel; Arnold, 1915 : 96. [Raised to species.]

DIAGNOSIS OF WORKER. First and second gastral tergites unsculptured. Pronotal dorsum sculptured with punctures separated by smooth, shining spaces.

FURTHER DESCRIPTION. *Worker.* TL 6·7, HL 1·30, HW 0·90, CI 70, SL 1·22, SI 135, PW 0·74, PH, PL – not measurable, DPW 0·50.

Head not broadened in front of eyes, the sides approximately straight. Maximum diameter of eyes ca 0·26, greater than the maximum width of the scape. Frontal groove extending to level of posterior margins of eyes. Clypeus broadly triangular, with a narrow, fringing lamella. Mandibles short and stout, closing tightly against the clypeus. Metanotal groove deeply impressed; gaster strongly constricted between first and second segments. All surfaces of body with numerous standing hairs. Dorsum of head densely punctate, the pronotal dorsum more sparsely so, with distinct smooth, shining spaces between the individual punctures, broader than those upon the head. Mesonotum similarly sculptured but propodeal dorsum also retaining traces of rugose sculpturation. Sides of pronotum very lightly sculptured; pleurae and sides of propodeum more strongly so, with distinct rugosity. Gaster unsculptured apart from hair-pits.

This species is closely related to *haviglandi*, the major differences separating the two belonging to the sculptural patterns of the head and alitrunk. When they are better known *peringueyi* and *haviglandi* may be found to be conspecific.

THE *NITIDA*-GROUP

(Text-figs 15, 17, 18, 25)

Mandibles short, closing tightly against the clypeus. Eyes medium to minute, their maximum diameter in full-face view ranging from just greater than the maximum width of the scape to considerably less than the scape width. Second funicular segment at most about as long as the third, usually shorter than the third. Head not or only slightly broadened anteriorly. Sculpture usually only of scattered fine punctures on the dorsal surfaces; reticulate-punctate in some species, rarely otherwise. Gaster constricted between first and segments segments.

This group of fourteen species divides itself into a number of complexes of more or less closely related forms. The first, including *cryptica*, *khaura* and *stygia*, is West African in distribution and is characterised by strong reticulate-punctate sculpture on the cephalic dorsum and by its small size. The second, including *buyssoni*, *ankhesa*, *honorio* and *strator* are known from Zaire, Cameroun and Ethiopia. They are larger species with relatively blocky petiole nodes and strongly developed subpetiolar processes. They appear to feed on termites. The remaining species are found in central, eastern and southern Africa, are medium-sized, lightly sculptured and with usually a simple lobiform subpetiolar process. One of them (*mactans*) appears to have convergently acquired a number of characters possessed by the *proceionalis*-group of the Oriental and Indo-Australian Regions.

Leptogenys amon sp. n.

(Text-fig. 18)

DIAGNOSIS OF WORKER. Head relatively long and narrow, CI ca 62. Circumocular groove very strongly developed. Petiole long and narrow, DPI < 70.

FURTHER DESCRIPTION. *Holotype worker.* TL 5·2, HL 1·12, HW 0·70, CI 62, SL 0·84, SI 120, PW 0·58, PH 0·52, PL 0·54, LPI 97, DPW 0·34, DPI 66.

Head elongate and narrow, increasing slightly in width anteriorly; occipital margin very shallowly concave, the sides of the head more or less straight. Maximum diameter of eyes

ca 0.18, about equal to the maximum width of the strongly dorsoventrally flattened scapes. Circumocular groove strongly developed in front of, above and behind the eye so that the eye appears to be sunk in an impression in the side of the head. Median portion of clypeus a broad, rounded lobe. Mandibles short and stout, closing tightly against the clypeus. Funicular segments 1-3 respectively ca 0.16, 0.18, 0.16. Metanotal groove an incised line; cross-ribbing is present in the groove but the individual ribs are so small that the spaces between them appear as a line of small punctures across the dorsum. Node of petiole in dorsal view longer than broad, broadest behind and narrowing anteriorly. Gaster strongly constricted between first and second segments. Short, standing hairs present on all surfaces. Completely devoid of sculpture except for hair-pits and cross-ribbing on the meso-metapleural suture. A few weak rugulae are present on the bulla of the metapleural glands and the propodeal declivity is transversely rugose, though only 2-3 complete rugae are present. Colour medium brown, the gaster lighter, the appendages a dark yellow-brown.

Holotype worker, CAMEROUN: Ototomo, 20.v.1968, JLA (G. Terron) (BMNH).

This species is easily distinguished from the other members of the *nitida*-group by its possession of marked circumocular grooves, elongate head and long, narrow petiole.

Leptogenys ankhesa sp. n.

(Text-fig. 25)

DIAGNOSIS OF WORKER. Subpetiolar process double, with separate anterior and posterior portions. Propodeal dorsum unsculptured. Scares relatively long, SI > 135.

FURTHER DESCRIPTION. *Holotype worker*. TL 6.1, HL 1.22, HW 0.84, CI 69, SL 1.20, SI 143, PW 0.76, PH 0.78, PL 0.58, LPI 134, DPW 0.62, DPI 107.

Head only very slightly broader in front than behind, the occipital margin straight to feebly concave, the sides more or less straight. Maximum diameter of eye ca 0.20, slightly greater than the maximum width of the scape in full-face view (ca 0.12-0.14). Clypeus broadly triangular, blunt apically. Mandibles short, closing tightly against the clypeus. Respective lengths of funicular segments 1-3 ca 0.20, 0.18, 0.20. Mesonotum distinctly broader than long. Metanotal groove impressed and cross-ribbed. Node of petiole in dorsal view broader than long, the anterior and posterior faces virtually parallel, the sides diverging posteriorly. In profile the node of the petiole broadening slightly from base to apex. Subpetiolar process double, complex, consisting of a lobe situated anteriorly, the posteroventral corner of which projects as a short tooth, and a more posteriorly situated short, blunt tooth, separated from the anterior lobe by a marked gap. Gaster strongly constricted between first and second segment. All dorsal surfaces of head and body with standing hairs, though these are sparse upon the first gastral tergite and propodeal. Unsculptured, smooth and shining except for small hair-pits and transverse rugulation on the propodeal declivity. Some faint rugae also present on the extreme lower portion of the metapleuron. Colour uniform red-brown.

Paratype worker. TL 5.9, HL 1.20, HW 0.84, CI 70, SL 1.20, SI 143, PW 0.78, PH 0.80, PL 0.56, LPI 142, DPW 0.62, DPI 111. Maximum diameter of eye 0.18; funicular segments 1-3 ca 0.18, 0.20, 0.20. Otherwise as holotype.

Holotype worker, ZAIRE ('Belg. Congo' on data label), Sona Mpungu, Forest, 21 km N. Lufu, 10.iv. 1948, 'ants collecting termites' (A. Emerson) (MCZ, Cambridge).

Paratype. 1 worker, same data as holotype (BMNH).

Related to *buyssoni* and *strator*, it is separated from the former by size and the more complex development of the subpetiolar process (the second tooth is absent

in *buyssoni*), and from the latter by details of sculpturation and shape of petiole node as given in the key and descriptions.

Leptogenys buyssoni Forel

Leptogenys (Lobopelta) buyssoni Forel, 1907a : 131. Holotype worker, ETHIOPIA: Hieka Bourka, 1905 (*Rothschild*) (MHN, Geneva) [examined].

DIAGNOSIS OF WORKER. Larger species, HL > 1.45; scapes relatively long, SI > 140. Eyes small, maximum diameter ca 0.16. Subpetiolar process with a posteroventral tooth.

FURTHER DESCRIPTION. *Worker*. TL 7.4, HL 1.52, HW 1.06, CI 70, SL 1.66, SI 156, PW 0.90, PH 0.84, PL 0.70, LPI 120, DPW 0.60, DPI 87.

Head not broadened anteriorly, broadest at the level of the eyes. Occipital margin straight to feebly convex, the sides of the head straight. Eyes small, only very weakly convex, maximum diameter ca 0.16, less than the maximum width of the scape. Clypeus broadly triangular. Mandibles short, closing tightly against the clypeus. Second funicular segment slightly longer than the third, respective lengths of segments 1-3 ca 0.24, 0.34, 0.30. Metanotal groove impressed and cross-ribbed, the propodeal dorsum with a slight longitudinal impression medially, most distinct at the midlength of the sclerite. Subpetiolar process a broad lobe, developed into a short tooth posteroventrally which projects from the body of the lobe. Gaster strongly constricted between first and second segments. All surfaces of body with short, standing hairs. Dorsal surfaces of head, alitrunk and gaster unsculptured apart from minute hair-pits. Sides of alitrunk with cross-ribbing at meso-metapleural suture and some short rugae near the metapleural gland, but otherwise as dorsum. Full adult colour red-brown.

This species is closest related to *strator* and *ankhesa*, but although the subpetiolar process is strongly developed in *buyssoni* it is not followed by a second lobe or tooth posteriorly as is the case in the other two species. Also *buyssoni* is distinctly larger than either *strator* or *ankhesa*.

Leptogenys castanea (Mayr)

Lobopelta castanea Mayr, 1862 : 734. Holotype worker, SOUTH AFRICA: Cape of Good Hope (BMNH) [examined].

Leptogenys (Lobopelta) parva Forel, 1901a : 330. Syntype workers, male, SOUTH AFRICA: Natal (*Haviland*) (MHN, Geneva) [examined]. **Syn. n.**

Leptogenys (Lobopelta) parva var. *bellua* Forel, 1914 : 214. Syntype workers, SOUTH AFRICA: Natal, Durban (*G. Arnold*) (MHN, Geneva) [examined]. **Syn. n.**

Leptogenys (Lobopelta) parva var. *dispar* Santschi, 1914b : 10. Syntype workers, SOUTH AFRICA: Natal, Zululand (*I. Trägårdh*) (NM, Basle; MRAC, Tervuren) [examined]. **Syn. n.**

Leptogenys hewitti Santschi, 1923 : 381, fig. 1. Syntype workers, SOUTH AFRICA: C.P., Grahamstown, 1920 (*J. Hewitt*) (BMNH) [examined]. **Syn. n.**

DIAGNOSIS OF WORKER. Small species with relatively short antennal scapes, HL < 0.90, SL < 0.75, SI < 120. Dorsal surfaces of body unsculptured.

FURTHER DESCRIPTION. *Worker*. TL 3.5-4.1, HL 0.74-0.88, HW 0.54-0.68, CI 70-79, SL 0.62-0.70, SI 100-117, PW 0.44-0.52, PH 0.40-0.44, PL 0.28-0.32, LPI 131-143, DPW 0.28-0.34, DPI 93-104 (12 measured).

Head not broader in front than behind, broadest behind the eyes. Occipital margin straight to feebly concave, the sides of the head shallowly convex. Eyes small, maximum diameter ca 0.08-0.12, equal to or slightly less than the maximum width of the scape in full-face view. Clypeus narrowly triangular medially. Mandibles short, closing tightly against the clypeus. Lengths of funicular segments 1-3 respectively ca 0.10-0.12, 0.08-0.10, 0.08-0.10. Subpetiolar

process a broad and strongly developed simple lobe. Gaster strongly constricted between first and second segments. All surfaces of body with numerous short, standing hairs. Unsculptured apart from transverse rugae on propodeal dorsum. Colour light yellow-brown to light brown.

This small species may be confused with the smaller, light-coloured workers of some populations of *nitida* but *castanea* may be distinguished by its scapes, which are consistently shorter, both relatively and absolutely, than those of *nitida*. Also, in the smallest *nitida* workers the eyes are about 0.12 in maximum diameter, whereas the eyes of only the largest examples of *castanea* approach this size. Finally, the HL of the largest *castanea* worker examined in this survey was 0.88, whereas that of the smallest *nitida* worker which could be found was 0.92.

MATERIAL EXAMINED.

RHODESIA: Bulawayo (*G. Arnold*). SOUTH AFRICA: Natal, Durban (*C. B. Cooper*); Durban (*I. Bevis*); Krantz Kloof (*H. B. Marley*); Zululand, Mfongosi (*G. Arnold*), E. Cape Prov., Beggar's Bush nr Grahamstown (*W. L. Brown*); Grahamstown, Fern Kloof (*W. L. Brown*); Alexandria Forest Reserve (*W. L. Brown*); Grahamstown (*F. Jacot-Guillarmod*).

Leptogenys cryptica sp. n.

DIAGNOSIS OF WORKER. Small species, HL < 0.75. Head densely reticulate-punctate; pronotum sculptured. Eyes very small, < 0.07; SI in the range 113–115.

FURTHER DESCRIPTION. *Holotype worker*. TL 2.8, HL 0.66, HW 0.46, CI 70, SL 0.52, SI 113, PW 0.38, PH 0.36, PL 0.24, LPI 150, DPW 0.24, DPI 100.

Head not broader in front than behind, broadest across the eyes. Sides of head shallowly convex, occipital margin straight to feebly concave medially. Eyes very small, maximum diameter ca 0.05, less than the maximum width of the scape in full-face view and with less than 10 facets. Clypeus narrowly triangular medially. Mandibles relatively short, closing tightly against the clypeus. Funicular segments 1–3 respectively ca 0.10, 0.08, 0.08. Metanotal groove reduced to a weak transverse impression, in profile scarcely more marked than the promesonotal suture; metanotal groove not cross-ribbed, in dorsal view less distinct than the promesonotal suture. Subpetiolar process a large subrectangular lobe without prominences or teeth. Gaster strongly constricted between first and second segments. All surfaces of body with numerous standing hairs. Dorsum of head coarsely and closely reticulate-punctate, the ventral surface with a number of foveolate punctures which are separated by smooth interspaces. Dorsal alitrunk strongly sculptured with a mixture of punctures and scattered rugulae, the latter most distinct upon the pronotum but not forming a pattern. Propodeal declivity transversely rugose. Sides of alitrunk as dorsum but more weakly so. Gaster smooth and shining, unsculptured. Colour uniform yellow-brown to mid-brown.

Paratype workers. TL 2.6–3.1, HL 0.64–0.68, HW 0.44–0.46, CI 67–70, SL 0.50–0.52, SI 113–115, PW 0.36–0.38, PH ca 0.36, PL 0.22–0.24, LPI 150–163, DPW 0.20–0.24, DPI 100–109 (4 measured). Diameter of eye 0.04–0.06; respective lengths of funicular segments 1–3 ca 0.10–0.12, 0.06–0.08, 0.06–0.08. Otherwise as holotype.

Holotype worker, GHANA: Tafo, 1.x.1970, 'rotten log' (*B. Bolton*) (BMNH).

Paratypes. 4 workers, same data as holotype (BMNH; MCZ, Cambridge; NM, Basle).

The combination of light colour, small size, strong sculpture and very small eyes should render this species easily recognizable. It is most closely related to

stygia which it resembles in many ways, but this latter species is larger, black, with larger eyes and with longer antennal scapes.

Leptogenys diatra sp. n.

DIAGNOSIS OF WORKER. Subpetiolar process a recurved tooth. Sides of head in front of eyes feebly concave. Small species, HL < 1.00.

FURTHER DESCRIPTION. *Holotype worker*. TL 3.9, HL 0.86, HW 0.62, CI 72, SL 0.80, SI 129, PW 0.48, PH 0.44, PL 0.34, LPI 129, DPW 0.30, DPI 88.

Head not broadened in front, broadest just behind the eyes. Sides of head behind eyes weakly convex, in front of eyes feebly concave. Occipital margin transverse, almost straight, with an extremely feeble convexity. Eyes with maximum diameter ca 0.10, equal to or very slightly less than the maximum width of the scape. Clypeus with an apically truncated, narrow, median triangular lobe, the anterior and lateral portions of which are translucent and lamellate. Mandibles short, closing tightly against the clypeus. Funicular segments 1-3 ca 0.14, 0.12, 0.12 respectively. Metanotal groove impressed and cross-ribbed. Subpetiolar process a broad-based, back-curved tooth or short spine. Gaster strongly constricted between the first and second segments. Standing hairs present upon all dorsal surfaces and on appendages. Unsculptured except for some fine punctures on the head anteriorly, between eye and frontal carinae, cross-ribbing in metanotal groove and transverse rugae on the propodeal declivity. Colour a uniform deep brown, shining.

Holotype worker, CAMEROUN: no. 1726 (no further data) (*G. Terron*) (BMNH).

This small species is closest related to *strator* and its allies but is separated from them by its lack of a second subpetiolar process. Because of this *diatra* runs out in the key with *nitida* and its immediate relatives but the characters given there will serve to separate the species.

Leptogenys honoria sp. n.

DIAGNOSIS OF WORKER. Subpetiolar process double. Ventral surface of head not sculptured. Pronotal dorsum with shallow foveolate impressions.

FURTHER DESCRIPTION. *Holotype worker*. TL 5.4, HL 1.08, HW 0.76, CI 70, SL 0.96, SI 126, PW 0.66, PH 0.64, PL 0.50, LPI 128, DPW 0.56, DPI 112.

Head not broader in front than behind, the sides more or less straight in full-face view, the occipital margin very feebly concave, almost straight. Maximum diameter of eye ca 0.16, equal to or slightly greater than the maximum width of the scape. Median lobe of clypeus triangular and prominent. Mandibles short, closing tightly against the clypeus. Funicular segments 1-3 ca 0.16, 0.14, 0.12 respectively. Metanotal groove impressed and cross-ribbed. Subpetiolar process double, consisting of an anterior lobe, the ventral angle of which is acute, and a posterior tooth, the two separated by a distinct semicircular notch or impression. Node of petiole in profile increasing slightly in thickness from base to apex, noticeably higher than long; in dorsal view the node is much broader than long. Gaster strongly constricted between first and second segments. Standing hairs present on all dorsal surfaces but very short and sparse on the first and second gastral tergites, reduced to a row across the posterior margin of each segment. Mostly smooth and unsculptured but with the following: pronotal dorsum with a number of broad, shallow impressions; meso-metapleural suture cross-ribbed; lower portion of metapleuron and bulla of metapleural glands finely rugose; propodeal declivity transversely rugose. Colour uniform red-brown, the appendages lighter.

Holotype worker, CAMEROUN: no. 1222 (no further data) (*G. Terron*) (BMNH).

The form of the petiole and particularly its ventral process allies this species

closely to *strator* and *ankhesa*, more distantly to *diatra* and *buyssoni*. The characters given in the key and diagnoses will separate these related species.

Leptogenys khaura sp. n.

DIAGNOSIS OF WORKER. Dorsum of head finely and densely punctulate, pronotal dorsum unsculptured. Eyes minute, diameter < 0.04 . Minute species, HL < 0.60 , PW < 0.35 .

FURTHER DESCRIPTION. *Holotype worker.* TL 2.1, HL 0.52, HW 0.38, CI 73, SL 0.42, SI 110, PW 0.30, PH 0.28, PL 0.16, LPI 175, DPW 0.22, DPI 137.

Head not broadened in front, broadest behind eyes. Occipital margin feebly concave, sides of head shallowly convex. Eyes minute, with less than 10 facets, their maximum diameter 0.04, considerably less than the maximum width of the scape. Clypeus narrowly triangular medially. Mandibles short, closing tightly against the clypeus. Funicular segments 1-3 ca 0.08, 0.04, 0.05 respectively; the third, fourth and fifth segments as broad as or broader than long. Metanotal groove impressed and cross-ribbed but the ribs so short that the groove appears to have a series of punctures traversing the alitrunk. Node of petiole in dorsal view much broader than long, anteroposteriorly compressed, the anterior face slightly convex, the posterior slightly concave. Subpetiolar process broad and subrectangular in shape, without projections or teeth. Node in profile somewhat inclined forwards. Gaster strongly impressed between first and second segments. All surfaces of body with numerous standing hairs. Dorsum of head shallowly, finely and densely punctulate, the ventral surface unsculptured. Pronotal dorsum unsculptured, smooth and shining, as are the sides of the pronotum, mesonotum, mesopleuron and gaster. Propodeal dorsum and sides and metapleuron mostly unsculptured but with some very fine, superficial regulation and a few punctures; propodeal declivity transversely rugose. Colour yellow-brown.

Paratype worker. TL 2.3, HL 0.54, HW 0.40, CI 74, SL 0.42, SI 105, PW 0.30, PH 0.30, PL 0.18, LPI 166, DPW 0.22, DPI 123. As holotype but propodeal sculpture much more reduced, the surface only superficially marked and with extensive smooth areas.

Holotype worker, NIGERIA: Ile-Ife, 5.viii.1971 (*J. T. Medler*) (BMNH).

Paratype. 1 worker as holotype but dated 21.vii.1971 (MCZ, Cambridge).

This species is the smallest member of the genus yet known from the Ethiopian Region. The combination of characters given in the diagnosis above will distinguish it from all other small or minute species of the region. In size it is approached only by *microps* of the *guineensis*-group but the differences between their respective groups separate them. Other small species such as *cryptica* and *stygia* are strongly sculptured and easily separable.

Leptogenys mactans sp. n.

(Text-fig. 17)

DIAGNOSIS OF WORKER. Antennal scapes relatively very short, SI < 95 . External margins of mandibles convex. Subpetiolar process with a posteroventral blunt tooth.

FURTHER DESCRIPTION. *Holotype worker.* TL 4.5, HL 0.94, HW 0.76, CI 81, SL 0.68, SI 90, PW 0.58, PH 0.48, PL 0.42, LPI 114, DPW 0.34, DPI 81.

Head not broader in front than behind, broadest just behind the eyes. Occipital margin shallowly concave, sides of head feebly convex. Eyes moderate, maximum diameter 0.16, slightly greater than the maximum width of the scape in full-face view. Eyes just failing to break the outline of the sides of the head in full-face view. Median lobe of clypeus short and broad, broadly truncated apically. Mandibles short and stout, their external margins

markedly convex, closing tightly against the clypeus. Antennal scapes very short, scarcely surpassing the midpoint of the occipital margin. Funicular segments 1-3 ca 0.12, 0.10, 0.10 respectively. Metanotal groove weakly impressed. Subpetiolar process a broad lobe with a short, rounded, posteroventral tooth. Gaster strongly constricted between first and second segments. All surfaces of head and body with numerous standing hairs. Unsculptured, completely smooth and shining apart from small hair-pits and a few faint transverse rugulae on the propodeal declivity. Colour red-brown.

Paratype worker. TL 4.8, HL 0.98, HW 0.78, CI 80, SL 0.72, SI 92, PW 0.60, PH 0.46, PL 0.40, LPI 115, DPW 0.34, DPI 85. Maximum diameter of eye 0.16. Otherwise as holotype.

Holotype worker, SOUTH AFRICA: Cape Province, Somerset East, x.1930 (*R. E. Turner*) (BMNH).

Paratype. 1 worker with same data as holotype (MCZ, Cambridge).

The short scapes, broad head, strongly curved short mandibles and the shape of the subpetiolar process serve to separate this species from its relatives. In some respects *mactans* appears to be convergent upon the species of the *processionalis*-group of the Oriental and Indo-Australian regions but in these species the mandibles have numerous teeth and the petiole tends to be anteroposteriorly compressed to form a thick scale. In *mactans* the mandibles have only two teeth (apical and preapical) and the petiole and its ventral process suggest that the species is related to *buyssoni* and its allies *ankhesa* and *strator*.

Leptogenys nitida (F. Smith)

Ponera nitida F. Smith, 1858 : 92. Syntype workers, SOUTH AFRICA: 'Port Natal' (= Durban) (BMNH) [examined].

Lobopelta nitida (F. Smith); Mayr, 1866 : 358.

Leptogenys intermedia Emery, 1902 : 32. Syntype workers, SOUTH AFRICA: Cape, Willowmore (*Brauns*) (MCSN, Genoa). **Syn. n.**

Leptogenys tenuis Stitz, 1911 : 376, fig. 1. Syntype workers, ZAIRE: Lake Kivu (*Mecklenburg*) (probably in MNHU, Berlin). [Synonymy by Forel, 1912a : 52.]

Leptogenys (Lobopelta) nitida var. *adpressa* Forel, 1914 : 214. Syntype workers, SOUTH AFRICA: Grahamstown (*Hewitt*) (MHN, Geneva) [examined]. **Syn. n.**

Leptogenys (Lobopelta) nitida var. *aena* Forel, 1914 : 215. Syntype workers, SOUTH AFRICA: Willowmore (*Brauns*) (MHN, Geneva) [examined]. **Syn. n.**

Leptogenys (Lobopelta) nitida var. *gracilis* Santschi, 1914b : 11. Holotype worker, ZAIRE: Lake Kivu (*Mecklenburg*) [attributed to Stitz] (NM, Basle) [examined]. [Junior homonym of *gracilis* Emery, 1899 : 271.] **Syn. n.**

Leptogenys (Lobopelta) nitida st. *insinuata* Santschi, 1914b : 11. Holotype worker, SOUTH AFRICA: Natal, Richmond, 24.iii.1905 (*I. Trägårdh*) (location of types not known). **Syn. n.**

Leptogenys (Lobopelta) nitida var. *grandior* Forel, 1915a : 335. Syntype workers, SOUTH AFRICA: Natal, Krantz Kloof (*H. B. Marley*) (MHN, Geneva) [examined]. **Syn. n.**

Leptogenys (Lobopelta) nitida race *brevinodis* Forel, 1915a : 335. Syntype workers, SOUTH AFRICA: Cape Province (*Brauns*) (MHN, Geneva; MRAC, Tervuren) [examined]. [Junior homonym of *brevinodis* Emery, 1914.] **Syn. n.**

Leptogenys (Lobopelta) nitida st. *speculans* Santschi, 1926a : 209. Syntype workers, ZAIRE: Lugumbe (*Gérard*) (NM, Basle) [examined]. **Syn. n.**

Leptogenys (Lobopelta) brevinodis var. *deflocata* Santschi, 1926a : 209. Syntype workers, MOZAMBIQUE: Forêt d'Amatonga, ii. 1917 (*G. Arnold*) (NM, Basle) [examined]. **Syn. n.**

Leptogenys nitida subsp. *capensis* Baroni Urbani, 1971 : 360. [Replacement name for *brevinodis* Forel, 1915.] **Syn. n.**

Note. Many of the above synonyms have been determined independently by Professor W. L. Brown and will be recorded by him in his forthcoming revision of the genera of tribe Ponerini.

DIAGNOSIS OF WORKER. Large species, HL > 0.90 , with SI > 120 . Eyes > 0.11 maximum diameter. Dorsal surfaces unsculptured except for hair-pits.

FURTHER DESCRIPTION. *Worker*. TL 4.6–5.7, HL 0.92–1.20, HW 0.66–0.88, CI 69–75, SL 0.86–1.08, SI 120–130, PW 0.52–0.70, PH 0.44–0.60, PL 0.40–0.48, LPI 110–125, DPW 0.32–0.40, DPI 80–95 (12 measured).

Head not broader in front than behind, broadest at about the level of the eyes. Occipital margin straight to feebly convex, sides of head shallowly convex. Maximum diameter of eyes ca 0.12–0.22, usually equal to or slightly greater than the maximum width of the scape in full-face view, rarely otherwise. Median lobe of clypeus triangular, blunt apically. Mandibles closing tightly against the clypeus, their outer margins somewhat concave. Funicular segments 1–3 ca 0.12–0.20, 0.10–0.18, 0.10–0.16 respectively. Subpetiolar process a simple lobe or with a small posteroventral tooth, very variable in size. Gaster strongly constricted between first and second segments. Short, standing hairs numerous upon all dorsal surfaces of head and body. Unsculptured, smooth and shining except for minute hair-pits and usually with a few transverse rugae on the propodeal declivity. Colour very variable, ranging from jet-black to light brown with all intermediate shades.

In terms of colour and size *nitida* is probably the most variable species of the genus in the Ethiopian Region; no two series examined in the course of this survey were exactly alike in all respects.

The larger or more darkly coloured individuals of *nitida* are unlikely to be confused with any other species but the smaller, more lightly coloured specimens may be mistaken for *castanea*. The characters given in the key and the notes under *castanea* will serve to distinguish the two species.

MATERIAL EXAMINED.

KENYA: (no data). ZAMBIA: Kipushi (*H. S. Evans*). BOTSWANA: Malepi Stream (*G. Arnold*); Mamathes (*C. Jacot-Guillarmod*). RHODESIA: Chirinda Forest (*G. Arnold*); Salisbury (*G. H. Bunzli*); Vumba Mts (*G. Arnold*); Umtali (*G. Arnold*). SOUTH AFRICA: Orange Free State (*Wroughton*); Transvaal, Piet Retief (*H. Brauns*); Ladismith (*H. Brauns*); Cape Prov., Oudtshoorn (*B. Malkin*); George (*H. Brauns*); Cape Prov., Montagu Pass (*A. Mackie*); Katberg (*R. E. Turner*); Grahamstown (*J. Hewitt*); Mossel Bay (*R. E. Turner*); Natal (*G. B. King*); Durban (*G. Arnold*), (*C. B. Cooper*), (*H. B. Marley*); Krantz Kloof (*H. B. Marley*); Natal, Slievre (*Haviland*); Natal, Estcourt (*G. Arnold*); Natal, Eshowe (*H. B. Marley*).

Leptogenys piroskae Forel

(Text-fig. 15)

Leptogenys (Lobopelta) piroskae Forel, 1910a: 247. Syntype workers, ETHIOPIA: Eritrea, Ghinda (*Escherich*) (NM, Basle) [examined].

DIAGNOSIS OF WORKER. Larger species, HL > 0.90 , with SI > 120 . Maximum diameter of eye < 0.10 . Dorsal surfaces unsculptured.

FURTHER DESCRIPTION. *Worker.* TL 4.7, HL 0.94, HW 0.70, CI 74, SL 0.86, SI 123, PW 0.56, PH 0.50, PL 0.42, LPI 119, DPW 0.38, DPI 91.

Sides of head slightly convex. Head broadest at, or just posterior to, the level of the eyes, not markedly broadened in front. Eyes small, maximum diameter 0.09, in full-face view situated just in front of the midlength of the sides of the head. In full-face view maximum diameter of eye less than maximum width of scape. Lengths of funicular segments 1-3 ca 0.18, 0.12, 0.12 respectively. Anterior margin of clypeus with a projecting median lobe which has a narrow fringing translucent lamella. Mandibles relatively short and quite stout, with a single preapical tooth and closing tightly against the clypeus. Metanotal groove impressed and cross-ribbed. Node of petiole blocky in profile, slightly higher than long (LPI > 100), the anterior and posterior faces almost parallel, the dorsum weakly convex. In dorsal view the node slightly broader behind than in front, with a convex anterior face and almost straight posterior face. Gaster strongly constricted between first and second segments. Head and body everywhere smooth and shining, unsculptured apart from hair-pits and except for the propodeal declivity which is transversely rugose and the metanotal groove and meso-metanotal suture, which are cross-ribbed. Standing hairs present on all dorsal surfaces. Colour uniform orange-brown or light brown.

Leptogenys strator sp. n.

DIAGNOSIS OF WORKER. Subpetiolar process double, with separate anterior and posterior portions. Propodeal dorsum rugose.

FURTHER DESCRIPTION. *Holotype worker.* TL 5.8, HL 1.22, HW 0.86, CI 70, SL not measurable, PW 0.72, PH 0.77, PL 0.54, LPI 133, DPW 0.52, DPI 96.

Head not broader in front than behind, broadest behind the eyes. Occipital margin shallowly concave, sides of head feebly convex. Eyes with maximum diameter ca 0.16 (antennae missing from all members of type-series). Median lobe of clypeus bluntly triangular. Mandibles short, closing tightly against the clypeus. Mesonotum broader than long; metanotal groove deeply impressed and cross-ribbed. Node of petiole in dorsal view about as broad as long, with the anterior and posterior faces almost parallel and the sides diverging posteriorly. In profile the node is broadest basally and tapers slightly above. Subpetiolar process double, complex, consisting of a broad lobe anteriorly, the posteroventral corner of which is acute, and a secondary blunt, short tooth, situated behind the lobe and separated from it by a distinct notch. Gaster strongly constricted between first and second segments. Standing hairs present on all dorsal surfaces, sparse (some may have been lost by abrasion). Dorsum of head finely and quite densely punctured in the space between the eye and frontal carinae, the remainder unsculptured apart from hair-pits. Ventral surface of head with large, shallow, poorly defined punctures, giving the surface an undulate appearance. Pronotal and propodeal dorsa rugose, the rugae broad, shallow and rounded, the propodeum more strongly sculptured than the pronotum. Meso-metapleural suture strongly cross-ribbed, the metapleuron and sides of the propodeum with some rugulation. Gaster smooth. Colour red-brown.

Paratype workers. TL 5.8-5.9, HL 1.24, HW 0.88, CI 71, (antennae missing), PW 0.70-0.74, PH 0.70-0.72, PL 0.54, LPI 129-130, DPW 0.54, DPI 100 (2 measured). Diameter of eye ca 0.14-0.16.

Holotype worker, ZAIRE: ('Belg. Congo' on specimen) Miken, 24.vii.1938 (*C. P. Haskins*) (MCZ, Cambridge).

Paratypes. 2 workers, same data as holotype (BMNH; MCZ, Cambridge).

Closest related to *ankhesa*, *strator* is distinguished by its sculpturation, which is absent from the former, and by the shape of the node which, in profile, is broader basally whereas in *ankhesa* the node is slightly narrower basally than it is above.

Leptogenys striatidens sp. n.

DIAGNOSIS OF WORKER. Mandibles densely striate. Head and pronotum covered with dense superficial reticulation.

FURTHER DESCRIPTION. *Holotype worker*. TL 5.6, HL 1.36, HW 0.92, CI 68, SL 1.14, SI 124, PW 0.76, PH 0.66, PL 0.54, LPI 122, DPW 0.52, DPI 96.

Head broadest in front, increasing slightly in width from back to front, the sides very weakly convex, the occipital margin feebly concave. Eyes small, their maximum diameter ca 0.14, less than the maximum width of the antennal scape. Median lobe of clypeus long, blunt apically and with weakly convex sides. Mandibles closing tightly against the clypeus, the angle at the junction of the inner and apical margins concealed by the lobe of the clypeus. Funicular segments 1-3 ca 0.16, 0.18, 0.18 respectively. Metanotal groove broad and shallow, very finely cross-ribbed. Gaster strongly constricted between first and second segments. Dorsal surfaces of head, body and appendages with numerous standing hairs. Mandibles finely and densely but very distinctly longitudinally striate. Dorsal surfaces of head and alitrunk covered by a fine, superficial reticulation. Sides of head below level of eyes similarly sculptured but also with elongate, shallow impressions. Pronotum with the reticulation petering out on the sides so that the lower halves are smooth. Lower halves of meso- and metapleurae rugose; propodeal declivity transversely rugose. Sides of petiole superficially reticulate but the posterior half of the dorsum smooth. Gaster smooth and shining. Colour black with faint traces of bluish opalescence; the appendages brown.

Holotype worker, CAMEROUN: Mt Kala, 820 m, 22.ii.1973 (*G. Terron*) (BMNH).

This species is unique amongst the members of the *nitida*-group known at present as it is the only one with strong sculpturation over the entire head and alitrunk, and possesses distinctly striate mandibles.

Leptogenys stygia sp. n.

DIAGNOSIS OF WORKER. Smaller species, HL < 0.80. Head densely reticulate-punctate. Pronotum sculptured. Diameter of eye 0.08-0.09; SI in the range 119-122.

FURTHER DESCRIPTION. *Holotype worker*. TL 3.2, HL 0.70, HW 0.48, CI 68, SL 0.58, SI 121, PW 0.38, PH 0.38, PL 0.26, LPI 146, DPW, 0.22, DPI 85.

Head not broader in front than behind, broadest behind the eyes. In full-face view the occipital margin straight to feebly concave; sides of head weakly convex. Maximum diameter of eye ca 0.08, in full-face view less than the maximum width of the scape. Median lobe of clypeus narrowly triangular. Mandibles short, closing tightly against the clypeus. Funicular segments 1-3 ca 0.10, 0.08, 0.08 respectively. Metanotal groove shallow, only weakly impressed, less distinct than the promesonotal suture. Subpetiolar process a broad, rounded lobe, without projections or teeth. Gaster strongly constricted between first and second segments. Standing hairs numerous upon all surfaces of head and body. Dorsum of head densely and quite coarsely reticulate-punctate, the ventral surface with scattered foveolate punctures separated by smooth, shining interspaces. Dorsal alitrunk with scattered punctures and fine rugulae, densest on the propodeum. Propodeal declivity transversely rugose. Sides of alitrunk sculptured as dorsum. Gaster shining, unsculptured apart from hair-pits. Black, the legs and scapes brown, the funicular segments yellow-brown.

Paratype workers. TL 3.0-3.2, HL 0.68-0.74, HW 0.48-0.52, CI 68-71, SI 119-122, PW 0.38-0.42, PH 0.36-0.40, PL 0.24-0.28, LPI 143-153, DPW 0.20-0.24, DPI 83-92 (7 measured). Maximum diameter of eye ca 0.08-0.09. Otherwise as holotype.

Holotype worker, NIGERIA: Gambari, 3.xi.1969, 'under fallen banana stem' (*B. Bolton*) (BMNH).

Paratypes. 7 workers, with same data as holotype (BMNH; MCZ, Cambridge; NM, Basle).

Most closely related to *cryptica*, from which it differs in size and colour, *cryptica* being smaller and yellow-brown with relatively shorter antennal scapes and smaller eyes. The specimens of *stygia* described above were discovered in a small piece of wet-rotten wood under a fallen and rotting banana stem. The species is also present in Cameroun as G. Terron (UFC, Yaounde) has sent me a specimen recently.

REVIEW OF SPECIES OF MALAGASY REGION

As the Malagasy fauna is so poorly known and collections of the genus from this region are virtually non-existent, a formal revision of the species has not been undertaken. Instead a list and provisional key are presented together with notes on the groups and types of species which I have examined, in the hope that the review will be of some benefit to further studies of the regional fauna.

LIST OF SPECIES

Species shared with the Ethiopian Region (*falcigera*, *maxillosa*, *stuhlmanni*) are not included.

- truncatirostris*-group
 - arcirostris* Santschi
 - ridens* Forel
 - truncatirostris* Forel
- attenuata*-group
 - angusta* (Forel)
 - coerulescens* Emery
 - grandidieri* Forel
- saussurei*-group
 - acutirostris* Santschi **stat. n.**
 - oswaldi* Forel
 - saussurei* (Forel)
- incisa*-group
 - alluaudi* Emery
 - antogilensis* Emery
 - gracilis* Emery
 - incisa* Forel
 - incisa* var. *imerinensis* Forel **syn. n.**
 - incisa* subsp. *suarensis* Emery **syn. n.**
 - voeltzkowi* Forel

PROVISIONAL KEY TO SPECIES

(Workers)

The key is based for the greater part on type-specimens and original descriptions only and consequently should be used with some care as no indication of degree of

variability of the species is known. All species are from Madagascar except where otherwise stated.

- 1 Standing hairs absent from dorsum of head, alitrunk and first two gastral tergites. Cuticle densely shagreened, with dense, pruinose pubescence 2
- Standing hairs present on some or all dorsal surfaces. Cuticle not densely shagreened, without pruinose pubescence 3
- 2 Node of petiole in dorsal view distinctly broader than long, DPW > 105 (panropical tramp species) *maxillosa*
- Node of petiole in dorsal view at least as long as broad, usually distinctly longer than broad, DPW 100 or less (panropical tramp species). *falcigera*
- 3 Anterior clypeal margin broadly rounded or transverse, not projecting into a triangular lobe medially. Mandibles elongate, narrow, but capable of closing against the clypeus. Head strongly broadened in front, the eyes not breaking the outline of the sides of the head in full-face view 4
- Anterior clypeal margin projecting into a triangular lobe medially. Mandibles short or elongate, but if elongate then not capable of closing against the clypeus. Head usually not broadened anteriorly, the eyes usually breaking the outline of the sides of the head in full-face view 6
- 4 Clypeus without a median, longitudinal carina *truncatirostris*
- Clypeus with a median, longitudinal carina 5
- 5 Antennal scapes both relatively and absolutely shorter, SL < 1.75 , SI < 125 *arcistrostris*
- Antennal scapes both relatively and absolutely longer, SL > 1.75 , SI > 135 *ridens*
- 6 Mandibles short, not linear, capable of closing tightly against the clypeus; without a gap between themselves and the clypeus when closed 7
- Mandibles elongate and linear, not capable of closing against the clypeus; with a large gap between themselves and the clypeus when closed 12
- 7 Dorsum of head and alitrunk unsculptured apart from minute pits from which hairs arise 8
- Dorsum of head, alitrunk, or both, distinctly sculptured 10
- 8 Propodeal declivity smooth and shining, not transversely rugose *angusta*
- Propodeal declivity transversely rugose 9
- 9 Smaller species, HL ca 1.40; black, without bluish reflections or opalescence. Median lobe of clypeus not distinctly longitudinally striate *grandidieri*
- Larger species, HL > 1.50 ; black with bluish reflections or opalescence. Median lobe of clypeus longitudinally striate *coerulescens*
- 10 Dorsum of head very densely and very finely reticulate-rugose, the interspaces minutely punctulate, without smooth shining areas. Small species, HL < 2.20 , diameter of eye ca 0.44 *oswaldi*
- Dorsum of head with scattered large punctures or foveolae, the spaces between which may have some faint striae but are mostly smooth and shining. Larger species, HL > 2.50 , diameter of eye > 0.50 11
- 11 Posterior border of petiole strongly emarginate in dorsal view. Larger species, HL > 2.85 , with larger eyes, maximum diameter > 0.70 *saussurei*
- Posterior border of petiole not emarginate in dorsal view. Smaller species, HL < 2.80 , with smaller eyes, maximum diameter < 0.65 *acutirostris*
- 12 Dorsum of head and first gastral tergite unsculptured apart from pits from which hairs arise. Gaster not constricted between first and second segments. (East Africa, Comoro Islands) *stuhlmanni*
- Dorsum of head sculptured, first gastral tergite usually with at least a fine, superficial reticulation. Gaster constricted between first and second segments *incisa*-group

[including *incisa*, *alluaudi*, *voeltzkowi*, *gracilis*, *antongilensis*]

THE *TRUNCATIROSTRIS*-GROUP

Mandibles elongate but closing tightly against the clypeus, with considerable overlap. Clypeus with a fringing lamella on the anterior margin, not projecting into a triangular lobe medially, either broadly rounded or transverse. Eyes large, their maximum diameter greater than the maximum width of the scape. Second funicular segment slightly longer than the third. Head broadened in front; the eyes not breaking the outline of the sides of the head in full-face view. Entirety of head and body sculptured, either reticulate-punctate, densely rugulose or densely but irregularly punctulate. Standing hairs present on all dorsal surfaces. Gaster strongly constricted between first and second segments.

The three species of this small group formerly constituted the subgenus *Machaerogenys*, now placed in the synonymy of *Leptogenys* (see p. 240).

Species included

Leptogenys arcistrostris Santschi

Leptogenys (Machaerogenys) arcistrostris Santschi, 1926b : 25. Holotype worker, MADAGASCAR: Moramanga (*Descarpentries*) (NM, Basle) [examined].

Leptogenys ridens Forel

Leptogenys ridens Forel, 1910b : 16. Holotype worker, MADAGASCAR: Fort Dauphin (*Sikora*) (MHN, Geneva) [examined].

Leptogenys truncatirostris Forel

Leptogenys truncatirostris Forel, 1897 : 195, fig. 2. Syntype workers, MADAGASCAR: Nossi Bé (*Voeltzkow*) (MHN, Geneva; NM, Basle) [examined].

Of the three species included in the group, *truncatirostris* is easily distinguished as it is larger (HL 1·88, HW 1·66, CI 88, SL 1·86, SI 112, PW 1·10) and lacks a median, longitudinal clypeal carina, which is present in all other species of both the Malagasy and Ethiopian regions. Also in *truncatirostris* the anterior margin of the clypeus is transverse, not convexly arched, and the mandibles are elongate and strongly curved basally. Each blade is broadened in the distal half of its length and then tapers to a long acute apex. A single, strongly developed preapical tooth is present which is curved in the direction of the mandibular apex.

The two remaining species, *arcistrostris* and *ridens*, are smaller (*ridens*: HL 1·70, HW 1·36, CI 80, SL 1·98, SI 145, PW 1·08; *arcistrostris*: HL 1·48, HW 1·28, CI 86, SL 1·50, SI 117, PW 0·96) with a median clypeal carina and a convex anterior clypeal margin. The mandibles in both species are elongate, curved slightly along their length, increasing slightly in thickness from base to apex and terminating in an abrupt apical surface. Preapical teeth are not present, the apical surface joins the inner margin through a curve. The two are easily separated as *ridens* is a larger species with relatively much longer scapes, as indicated in the measurements above.

THE *ATTENUATA*-GROUP

Characteristics of the group given on p. 274.

Species included

Leptogenys angusta (Forel)

Lobopelta angusta Forel, 1892 : 519. Syntype workers, MADAGASCAR: Imerina, Andrangoloaka Forest (*Sikora*) (MHN, Geneva) [examined].

Leptogenys coerulescens Emery

Leptogenys coerulescens Emery, 1895b : 339. Syntype workers, MADAGASCAR: Diego Suarez, 1893 (*Ch. Alluaud*) (probably in MCSN, Genoa).

Leptogenys grandidieri Forel

Leptogenys (*Lobopelta*) *grandidieri* Forel, 1910b : 17. Holotype worker, MADAGASCAR: Fort Dauphin (*Sikora*) (MHN, Geneva) [examined].

L. angusta is a large species, with CI and SI within the range of *attenuata*, which it resembles (*angusta*: HL 2.24, HW 1.34, CI 60, SL 2.56, SI 191). As in *attenuata* the petiole in dorsal view is much longer than broad, strongly narrowed in its anterior half. The smooth integument has a scattered, bluish opalescence and the propodeal declivity is smooth, without transverse rugae. The median lobe of the clypeus is not longitudinally striate.

L. coerulescens appears to be related to *angusta* and also has bluish opalescence, but in this species the propodeal declivity is transversely rugose and the median clypeal lobe is longitudinally striate.

The last known species of the group, *grandidieri*, is smaller (HL 1.40, HW 0.92, CI 66, SL 1.30, SI 141) and on the whole appears to be more closely related to *crassinoda* than to any of the above. The petiole in dorsal view is longer than broad, but is only slightly broader behind than in front. The propodeal declivity is transversely rugose but the median lobe of the clypeus lacks striae, apart from a few on the extreme lateral portions.

THE *SAUSSUREI*-GROUP

Mandibles short, closing tightly against the clypeus. Eyes large, their maximum diameter greater than the maximum scape width. Second funicular segment only slightly longer than the third. Head not or only slightly broadened anteriorly. Dorsum of head and alitrunk sculptured.

Of the three species in the group two are closely related whilst the third, *oswaldi*, may not actually belong to the group as the gaster is constricted between the first and second segments, a feature much reduced in *saussurei* and *acutirostris*. All three species are large.

Species included

***Leptogenys acutirostris* Santschi stat. n.**

Leptogenys saussurei st. *acutirostris* Santschi, 1912 : 150. Holotype worker, MADAGASCAR (Le Moult) (NM, Basle) [examined].

***Leptogenys oswaldi* Forel**

Leptogenys o'swaldi Forel, 1891a : 119, pl. 4, fig. 2. Holotype worker, MADAGASCAR: 30 milles au Nord-Ouest de Tamatave (O'Swald) (MHN, Geneva) [examined].

***Leptogenys saussurei* (Forel)**

Lobopelta saussurei Forel, 1891a : 121. Holotype worker, MADAGASCAR: Mahanoro, côte Est de Madagascar (Saussure) (MHN, Geneva) [examined].

L. oswaldi is the smallest species of this group (HL 2.08, HW 1.68, CI 80, SL 2.06, SI 124, PW 1.32) and the head is relatively broad. The gaster is strongly constricted between the first and second segments and the eyes have a maximum diameter ca 0.44. Dorsum of head densely sculptured with a fine rugoreticulum, the interspaces of which are minutely punctulate. The remaining two species are larger and less strongly sculptured, with narrower heads and the gastral constriction very weak indeed. The larger of the two, *saussurei* (HL 2.94, HW 1.98, CI 67, PW 1.84; (antennae missing from holotype) has an ocular diameter of 0.80 at maximum. The clypeus and gena to the level of the eye is longitudinally rugose but the dorsum of the head is coarsely punctured, the punctures becoming larger, shallower and more widely spaced posteriorly, separated by smooth interspaces. Petiole in dorsal view has the posterior margin strongly concave, the posterolateral angles prominent. *L. acutirostris* is similarly sculptured but is smaller (HL 2.76, HW 1.84, CI 63, SL 2.34, SI 127, PW 1.60) with smaller eyes, maximum diameter ca 0.58. The posterior margin of the petiole in dorsal view is not excised as in *saussurei*.

THE *INCISA*-GROUP

Mandibles elongate, curved, not capable of closing against the clypeus. Eyes medium to large; maximum diameter greater than maximum width of scape, if only slightly so. Second funicular segment longer than third. Head usually broadest at about the level of the eyes, the sides convex. Gaster constricted between first and second segments. Dorsum of head densely sculptured, either reticulate-punctate or with a fine, dense rugoreticulum with punctulate interspaces. First gastral tergite usually sculptured, at least with a superficial reticulation. Dorsal alitrunk sculptured.

Species included

***Leptogenys alluaudi* Emery**

Leptogenys alluaudi Emery, 1895b : 338. Holotype worker, MADAGASCAR: Diego Suarez, iv-viii. 1893 (*Alluaud*) (probably in MCSN, Genoa).

Leptogenys antongilensis Emery

*Leptogenys incis*a var. *antongilensis* Emery, 1899 : 272, fig. Holotype worker, MADAGASCAR:

Baia di Antongil, 1897-98 (*A. Mocquerys*) (probably in MCSN, Genoa).

Leptogenys antongilensis Emery; Emery, 1911 : 100. [Raised to species.]

Leptogenys gracilis Emery

Leptogenys gracilis Emery, 1899 : 271. Syntype workers, MADAGASCAR: Bia di Antongil, 1897-98 (*A. Mocquerys*) (probably in MCSN, Genoa).

*Leptogenys incis*a Forel

*Leptogenys incis*a Forel, 1891a : 113, pl. 4, figs 1, 1a. Syntype workers, MADAGASCAR: Montagne de Lokobé, a Nosibé (*O'Swald*) (location of types not known).

*Leptogenys incis*a var. *imerinensis* Forel, 1891b : 242. Syntype workers male, MADAGASCAR: Forêt d'Andrangoloaka (*Sikora*) (MHN, Geneva) [examined]. **Syn. n.**

*Leptogenys incis*a subsp. *suarensis* Emery, 1895b : 338. Syntype workers, MADAGASCAR: Diege Suarez, 1893 (*Alluaud*) (probably in MCSN, Genoa). **Syn. n.**

Leptogenys voeltzkowi Forel

Leptogenys voeltzkowi Forel, 1897 : 194. Syntype workers, MADAGASCAR: Nossi Bé (*Voeltzkow*) (MHN, Geneva; MCZ, Cambridge) [examined].

The few specimens and types of this group which I have been able to examine show that the species are closely related. It will not be possible to sort the species accurately until all the types can be examined and compared, and until some other collections have been made.

A SPECIES EXCLUDED FROM *LEPTOGENYS**Pachycondyla jonesii* (Forel) **comb. n.**

Lobopelta jonesii Forel, 1891a : 219. Syntype males, MADAGASCAR: Forêt d'Andrangoloaka (*Sikora*) (MHN, Geneva) [examined].

This species, known from two males, was originally placed by Forel in *Lobopelta* even though the pretarsal claws were not pectinate, as he pointed out in the original description. In fact, each claw has a single small tooth at about the midlength. Other definitive characters besides this, leading to the exclusion of *jonesii* from *Leptogenys* and its placement in *Pachycondyla*, include the curved, spiniform extension of the pygidium (absent from *Leptogenys*), the absence of notauli (usually present in *Leptogenys*), and the presence of an anal lobe on the hind wing (absent from *Leptogenys*).

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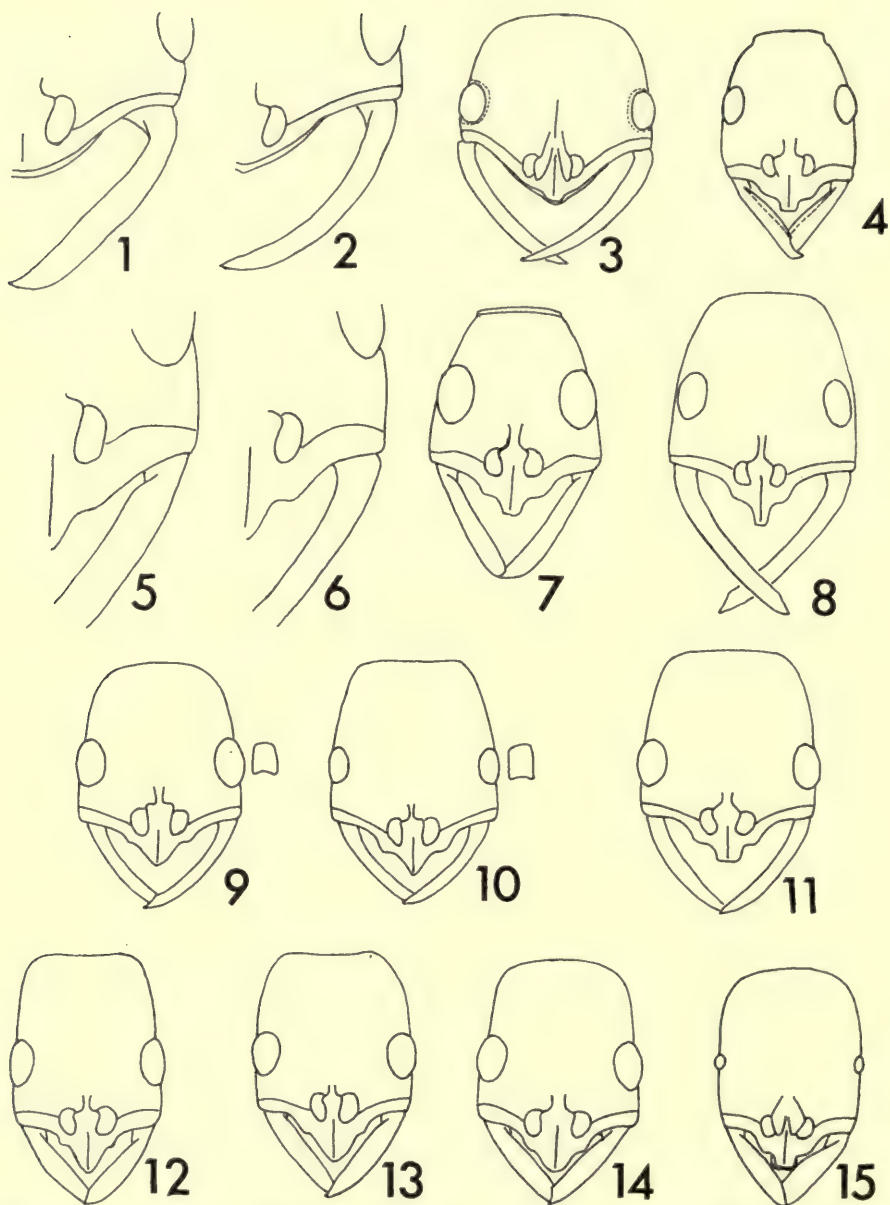
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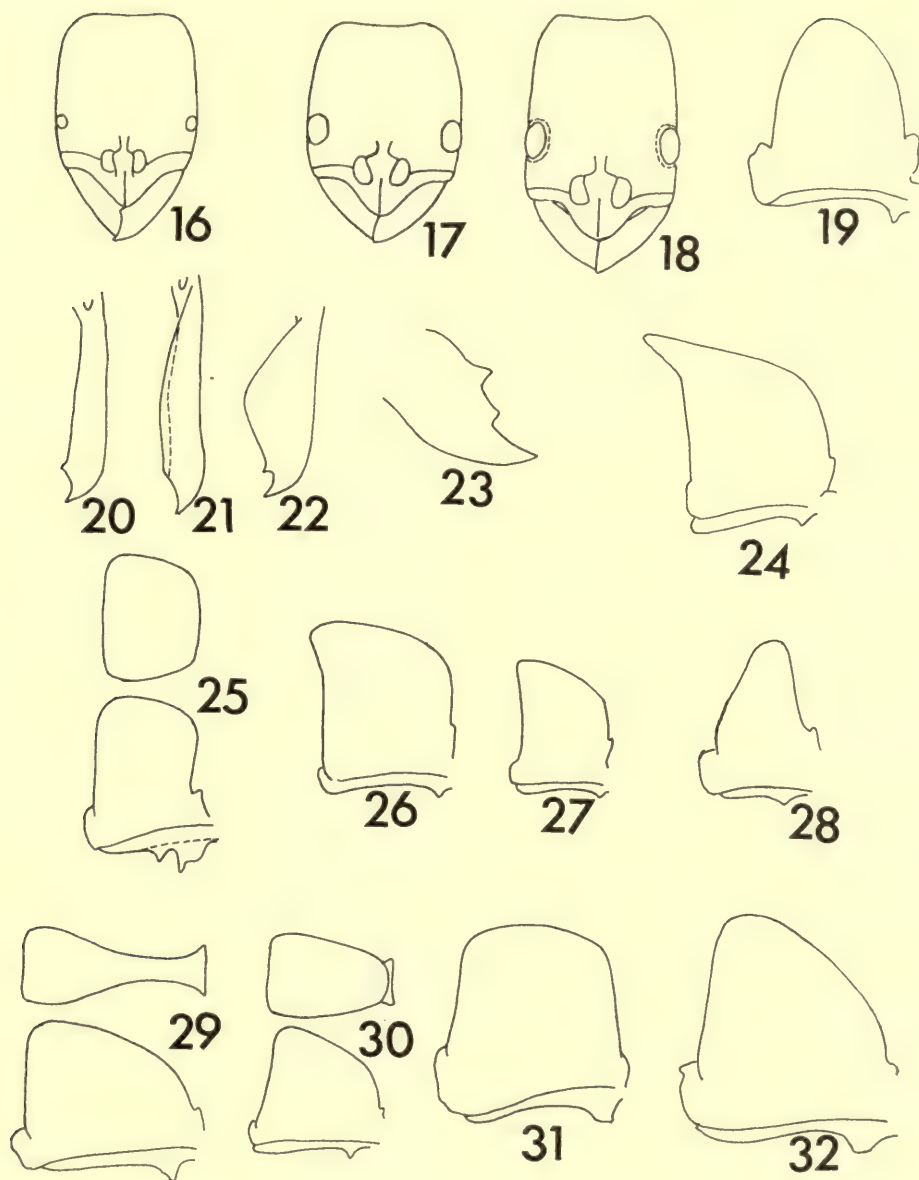
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FIGS 1-15. 1. Anterior portion of head and left mandible of *Leptogenys pavesii*. 2. Anterior portion of head and left mandible of *L. falcigera*. 3. Outline of head of *L. jeanneli*, pilosity and antennae omitted. 4. Outline of head of *L. zapyxis*, pilosity and antennae omitted. 5. Base of left mandible in *L. camerunensis* and allies. 6. Base of left mandible in *L. stuhlmanni* and allies. 7-15. Outlines of heads of (7) *L. camerunensis*; (8) *L. regis*; (9) *L. elegans* (offset shows size of 3rd funicular segment); (10) *L. ravida* (offset shows size of 3rd funicular segment); (11) *L. tribolata*; (12) *L. mastax*; (13) *L. occidentalis*; (14) *L. sulcinoda*; (15) *L. piroskae*; pilosity and antennae omitted, mandibles of 12-15 slightly opened.



FIGS 16-32. 16-18. Outlines of heads of (16) *Leptogenys guineensis*; (17) *L. mactans*; (18) *L. amon*; pilosity and antennae omitted. 19. Lateral petiole node shape of *L. zapyxis*, anterior face to right. 20-22. Mandibular shape in (20) *L. sterops*; (21) *L. zapyxis*; (22) *L. ergatogyna*. 23. Apex of mandible of *L. testacea*. 24-32. Lateral petiole node shape of (24) *L. crustosa*; (25) *L. ankhesa*, dorsal view above; (26) *L. princeps*; (27) *L. mastax*; (28) *L. spandax*; (29) *L. attenuata*, dorsal view above; (30) *L. crassinoda*, dorsal view above; (31) *L. jeanneli*; (32) *L. camerunensis*; anterior face of petiole to the right in all cases.

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J. A. MARSHALL

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY

Vol. 31 No. 8

LONDON : 1975

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A CATALOGUE OF THE PRIMARY TYPES OF
MANTODEA (DICTYOPTERA) IN
THE BRITISH MUSEUM (NATURAL HISTORY)

BY
JUDITH ANNE MARSHALL

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MANTODEA (DICTYOPTERA) IN
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SYNOPSIS

An alphabetical catalogue is given of the holotypes, lectotypes (and associated paralectotypes) and syntypes of Mantodea in the collection of the British Museum (Natural History); 278 nominal species are represented by such type-material. Two lectotypes are newly designated.

INTRODUCTION

KIRBY (1904*b*) indicated in his *Synonymic Catalogue* that there were at that time 78 nominal species of Mantodea represented by holotypes or syntypes in the British Museum (Natural History). In the course of re-curating the Mantodea collection I have found that the types of a further 200 nominal species have since been added, and this would seem an appropriate time to publish a new list.

The primary types, comprising holotypes, lectotypes (and their associated paralectotypes) and syntypes, are listed alphabetically by their original specific, subspecific or varietal name. The information for each type is given, when available, in the following standard sequence.

- Specific name, original genus in parentheses, author, date and page reference of original publication.
- Status, sex, locality, any bionomic information, date of collection and collector of type(s); reference to lectotype designation if applicable; mention of any significant damage.
- Any further annotations, in a separate paragraph.

In listing the data for each specimen the name of the country, in its correct form, is always given first, in capitals; the remaining items of locality data are then listed in descending order of magnitude, irrespective of the order in which they may appear on the label(s). When the country name given on the label differs from the one in current use, the older name given on the label is added in inverted commas. When the country name has been omitted from the label but is known, it is enclosed in

square brackets. If a place name given on the label differs in any way from the orthography in current English use, the name is quoted in inverted commas; if such a name is a misspelling or a name no longer in use, the correct spelling or currently used name is added in square brackets. The date of collection is always given in standard form, with Arabic numerals for the day and year, and Roman numerals for the month. The collector's name is given in parentheses and italicized. Where a specimen is from a particular person's collection but may not have been collected by that person the name of the person, followed by 'Coll.' is given, in parentheses but not italicized.

The data listed for each specimen is usually that taken from the label(s) pinned under the specimen. However, all the specimens have been checked against the original descriptions and in a few cases the published information augments the data on the labels; such information has been added to the data listed and marked as '[published information]'. Discrepancies between the published information and the label data have also been noted, and so too has a mistaken statement of the sex of a specimen; however, no attempt has been made to detect inaccuracies in the morphological descriptions of the specimens. Where a label on a specimen indicates that it has been the subject of a published illustration, this information is included with the data.

All the specimens bear a British Museum (Natural History) registration number, which includes the year in which the specimen was received by the Museum. As this number is usually shared with many other specimens, often belonging to quite unrelated species, it is not quoted unless there is a special reason for doing so. Several older specimens bear a registration number but no date of collection, and some authors, notably Beier (1930a; 1930b; 1932; 1937a; 1937b), consistently quoted the year of registration as the year of collection.

The status of each type-specimen has been carefully checked against the original description, and all the types bear the circular colour-coded status labels used in the British Museum (Natural History): red for a holotype, purple for a lectotype, and blue for a paralectotype or syntype. Lectotypes have only been newly designated in the two cases where it was thought particularly desirable to do so (*Mantis lucubrans* Burchell and *Theopompa westwoodi* Kirby). When only part of a syntypic series is present in the British Museum (Natural History) collection, the published number, sex and depository of the other syntypes are noted, to the extent that such information is available. The depositories are abbreviated as follows.

BMNH	British Museum (Natural History).
FRI	Forest Research Institute, Dehra-Dun.
ISSS	Istituto Superiore di Storia della Scienza, Florence.
IZPAN	Instytut Zoologiczny, Polska Akademia Nauk, Warsaw.
MCSN	Museo Civico di Storia Naturale, Genoa.
MHN	Muséum d'Histoire Naturelle, Geneva.
MIZSU	Museo ed Istituto di Zoologia Sistemática dell'Università, Turin.
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin.
MRAC	Musée Royal de l'Afrique Centrale, Tervuren.
NR	Naturhistoriska Riksmuseum, Stockholm.
UM	University Museum, Oxford.

Many type-specimens bear identification labels by the original author. In those cases where there is no such label but type status has been established, an identification label bearing the original name, status and sex, with 'det. J. A. Marshall, 1974.', has been added.

In addition to the 78 nominal species correctly listed as types by Kirby (1904b), were two which he erroneously considered to be represented by type-material. The single (♂) specimen of *Phyllocrania westwoodi* Wood-Mason, 1876, and the two (1 ♂, 1 ♀) specimens of *Melliera apotogamia* Saussure, 1892, in the British Museum (Natural History) collection, are in both cases specimens seen by the authors and recognized as conspecific with the type-material, but not part of the type-species. Of the Fabricius type-material, maintained in the Banks Collection at the British Museum (Natural History), the types of two species, *Mantis cancellata* Fabricius, 1775, and *Mantis urbana* Fabricius, 1775, cannot be traced, and were not indicated as present by Kirby (1904b). The types of three other species cannot be traced in the British Museum (Natural History) collection, the holotype (♂) of *Metriomantis pilosella* Giglio-Tos, 1915, a syntype (♂) of *Leptomantis indica* Giglio-Tos, 1915, and the two (1 ♂, 1 ♀) syntypes of *Eremiaphila cairina* Giglio-Tos, 1917.

My thanks are due to Dr D. R. Ragge for his advice and assistance during the preparation of this work.

CATALOGUE

abyssinicus (*Pseudoharpax*) Beier, 1930b : 457. Holotype ♂, ETHIOPIA: 'Abyssinia', plains N. of Lake Zwai, 5500–6000 ft, 3–4.xi.1926 (*Dr H. Scott*).

acuminatus (*Catasigerpes*) Kevan, 1954 : 467. Holotype ♂, KENYA: N.F.D., El Wak, desert grass and thorn-bush, 5.xii.1944 (*D. K. Kevan*).

affinis (*Coptopteryx*) Giglio-Tos, 1915b : 65. 1 ♂ syntype?, ARGENTINA (*O. W. Thomas*).

Although this specimen was labelled by the author as 'cotyp.', the published data included only specimens from Brazil in the MNHU, Berlin and from Uruguay in the ISS, Florence.

aliena (*Amantis*) Beier, 1930b : 439. Holotype ♀, [BURMA:] Tenasserim.

ammonita (*Eremiaphila*) Uvarov, 1933a : 664. Holotype ♀, JORDAN: 'Palestine', Amman, E. of Jordan, 25.viii.1921 (*P. A. Buxton*).

androgyna (*Stagmomantis*) Saussure & Zehntner, 1894 : 147. Holotype ♂, [BELIZE:] Belize (*Blancaneaux*).

apotogamia (*Melliera*) Saussure, 1892 : 123. See page 311.

arabica (*Ameles*) Uvarov, 1939a : 551. Holotype ♂, SAUDI ARABIA: 'Arabia', Ahlal [published in error as Abhah] 15.vi.1931 (*H. St J. B. Philby*).

arabica (*Nilomantis*) Beier, 1930b : 438. Holotype ♂, OMAN: 'Muscat', Pass of Khubain, 1926 (*J. Fernandez*).

arabicus (*Tarachodes*) Uvarov, 1922 : 352. Holotype ♂, SAUDI ARABIA: 'S. W. Arabia', El Kubar (*G. W. Bury*).

Uvarov mistakenly quotes the data of the holotype as identical with that of the paratypes, i.e. SAUDI ARABIA: 'Arabia', Ktubu (*G. W. Bury*).

The head and pronotum on the ♂ paratype is that of the ♀ paratype (head 'mutilated' as stated by Uvarov), and probably the head and pronotum on the ♀ paratype is that of the ♂ paratype.

argentina (*Leptomiopteryx*) Beier, 1930b : 444. Holotype ♂, ARGENTINA: 'Argentine Republic', Villa Ana, F.C.S.Fe., ii.1926 (*K. J. Hayward*).

aruaana (*Hierodula*) Westwood, 1889 : 35. Holotype ♀, [INDONESIA:] Aru Island, 'Westw. Mantd. pl. 4, f. 4.' (*Wallace*).

assamensis (*Indothespis*) Werner, 1935 : 497. Holotype ♂, [INDIA:] Assam, Goalpara [published in error as 'Goalpore'], Kochugaon, v. 1906 [tip of abdomen missing].

atra (*Gonypetella*) Giglio-Tos, 1915c : 143. Holotype ♂, UGANDA: 'Uganda Prot.', plains N.E. of Lake Edward, 3200 ft, 15-16.x.1911 (*S. A. Neave*).

atrocephala (*Gonypetella*) Beier, 1930b : 442. Holotype ♂, [SOUTH AFRICA:] Johannesburg, Bloksberg [error for Boksburg] (*C. H. Peard*).

aurea (*Sphodromantis*) Giglio-Tos, 1917 : 63. 1 ♂ syntype, [GHANA:] 'W. Africa', Fantee country [published in error as 'Fantec'], Bosso (*Dr S. H. Jones*); 1 ♂ syntype, LIBERIA: 'Liberian Coast', Nanna Cru (*W. P. Lowe*); 1 ♀ syntype, GHANA: 'Gold Coast', Bibianaha, ix-xii.1909 (*Dr Spurrell*).

australiana (*Orthodera*) Giglio-Tos, 1917 : 107. 1 ♂ syntype, AUSTRALIA: 'N. Australia', Alexandria, i.1906 (*W. Stalker*); 1 ♀ syntype, AUSTRALIA: 'Cent. Australia', Hermannsburg (*H. J. Hillier*).

australis (*Miomantis*) Beier, 1930b : 451. Holotype ♂, SOUTH WEST AFRICA: Okahandja, 19-29.iii.1928 (*R. E. Turner*).

baetica (*Mantis*) Rambur, [1838] : 19. Lectotype ♀, [SPAIN:] Malaga [published information]; designated by Uvarov (1948 : 371).

Paralectotypes. 1 ♂, [SPAIN:] Malaga [published information]; 1 ♀, [SPAIN:] 'Grenade'.

Rambur said he found the species near Malaga, and Uvarov included the ♀ from Granada as a paralectotype in the belief that it was labelled as being from Malaga.

bandanus (*Tarachodes*) Giglio-Tos, 1917 : 98. Holotype ♂, GHANA: 'Gold Coast', N. Territories, Banda, 24.v.1913 (*Jas. J. Simpson*).

bidens (*Spanionyx*) Saussure & Zehntner, 1894 : 177. Holotype ♀, [HONDURAS:] 'Ruatan' Island, 'figuré' (*Gaumer*).

bispinosa (*Diacanthomantis*) Giglio-Tos, 1915b : 43. Holotype ♀ nymph, SRI LANKA: 'Ceylon', near Kandy (*A. Willey*).

boliviana (*Musonia*) Beier, 1930b : 443. Holotype ♂, BOLIVIA (*J. Steinbach*).

borneana (*Paratoxodera cornicollis*) Beier, 1932 : 154. Holotype ♂, BRUNEI: i.vi.1921 (Pres. by Mrs L. A. Allen).

brevicollis (*Oxyothespis*) Beier, 1930b : 448. Holotype ♂, ETHIOPIA: 'Abyssinia', S.E. of Lake Zwai, circa 5500 ft, 10-13.xi.1926 (*J. Omer-Cooper*).

brevipennis (*Oxyothespis*) Beier, 1930b : 448. Holotype ♂, GHANA: 'Gold Coast', Makango, 18.vi.1928 (*A. W. J. Pomeroy*).

brevis (*Mantis*) Rambur, [1838] : 21. Lectotype ♂, [SPAIN:] 'Grenade'; designated by Uvarov (1948 : 371) [abdomen detached and stuck on card].

Paralectotypes. 2 ♀, [SPAIN:] 'Grenade' [published information].

- brunneri** (*Humbertiella* (?)) Kirby, 1904a : 83. 2 ♂ syntypes, [INDONESIA:] Lombok, Sapit 2000 ft, v-vi. 1896 (Heyene Coll.); 1 ♀ syntype [no locality label] (Heyene Coll.).
- burri** (*Oxyphilus* (*Setoxyphilus*)) Roy, 1969 : 1119. Holotype ♂, ANGOLA: Villa Luso, 3.xi.1927 (*M. Burr*).
- cairina** (*Eremiaphila*) Giglio-Tos, 1917 : 81. See page 311.
- cancellata** (*Mantis*) Fabricius, 1775 : 276. See page 311.
- capensis** (*Galepsus*) Beier, 1930b : 436. Holotype ♂, SOUTH AFRICA: Cape Province, Ceres, ii. 1925 (*R. E. Turner*).
- cattulus** (*Creobroter*) Westwood, 1889 : 42. Holotype ♂, [INDONESIA:] Java, 'Westw. Mon. Mant. pl. 9, f. 10' (*E. I. C.*).
- centralis** (*Phthersigena*) Giglio-Tos, 1915b : 32. Holotype ♀, AUSTRALIA: 'Central Australia', Hermannsburg (*H. J. Hillier*).
- ceylonica** (*Compsomantis*) Uvarov, 1927a : 88. Holotype ♀, SRI LANKA: 'Ceylon', from the old collection of Colombo Museum, no exact data [published information].
- championi** (*Acontista*) Kirby, 1904a : 233. See *quadrifasciata* (*Acontista mexicana* var.) Saussure & Zehntner.
- championi** (*Angela*) Saussure & Zehntner, 1894 : 158. Holotype ♀, [GUATEMALA:] Vera Paz, Cubilguitz (*Champion*) [abdomen missing].
- championi** (*Phasmomantis*) Saussure & Zehntner, 1894 : 149. Holotype ♀, [PANAMA:] V. de Chiriqui, 25-4000 ft (*Champion*).
- coeca** (*Iris oratoria*) Uvarov, 1931a : 235. Holotype ♂, SUDAN: Khor Arbaat Delta, iv-v. 1926 (*H. B. Johnston*).
- collenettei** (*Eremiaphila*) Beier, 1930a : 193. Holotype ♂, SOMALI REPUBLIC: 'British Somaliland', Buran, 3000 ft, 10°13' N, 48°47' E, 19.xii.1929 (*C. L. Collenette*).
- congica** (*Hoplocorypha*) Giglio-Tos, 1916 : 18. 1 ♂ syntype, [ZAIRE:] S.E. Katanga, 4000 ft, 8.xii.1907 [head and all legs missing].
2 ♂ and 1 ♀ syntypes in the MRAC, Tervuren.
- congica** (*Metentella*) Giglio-Tos, 1915c : 178. 1 ♂ syntype, [ZAIRE:] S.E. Katanga, 4000 ft, 10-11.xii.1907 (Neave Coll.); 2 ♀ syntypes, [ZAIRE:] Fwambo.
- cornuta** (*Theoclytes chlorophaea* var.) Saussure & Zehntner, 1894 : 191. 1 ♀ syntype, [GUATEMALA:] Capetillio (*G. C. Champion*).
Additional syntype(s) in the MHN, Geneva.
- coronatus** (*Galepsus*) La Greca, 1952 : 12. Holotype ♀, ETHIOPIA: Didessa River, 4000 ft, v. 1946 (*K. Guichard*).
- costalis** (*Carvillia*) Kirby, 1904a : 85. Holotype ♀, ETHIOPIA: 'Abyss.'.
- crassa** (*Popa*) Giglio-Tos, 1917 : 73. Holotype ♀, MALAWI: 'Nyassaland' (*Dr J. E. S. Old*).
- culicivora** (*Ligariona*) Giglio-Tos, 1915c : 175. Holotype ♂, ANGOLA: W. Africa, "'Stated by natives to prey on mosquitoes.'" (Note by donor.), 1905 (*Dr F. C. Wellman*).
- cycloptera** (*Eremiaphila*) Uvarov, 1939a : 550. Holotype ♀, SAUDI ARABIA: 'Arabia', S. Hedjaz, Daka, 17.x.1931 (*H. St J. B. Philby*).
- cypria** (*Ameles*) Uvarov, 1936b : 507. Holotype ♂, CYPRUS: Limassol, 3.v.1923 (*G. A. Mavromoustakis*).

deserti (*Iris*) Uvarov, 1923 : 60. Holotype ♀, ALGERIA: 'Alger. C. Sahara', S. Oued Mya, 1912 (*Hartert & Hilg.*).

Uvarov mistakenly quotes the data of the holotype as identical with that of the 2 ♂ paratypes, i.e. [ALGERIA:] North of In Salah, Ain Guettara, 12-14.iv.1912 (*Hartert & Hilg.*). He also states that he did not see any specimens from S. Oued Mya, although he knew of their existence; this must be a mistake in the case of the single female, which is labelled, described and illustrated as the holotype.

dhufarica (*Sphrodromantis*) Uvarov, 1933b : 261. Holotype ♀, OMAN: 'S.E. Arabia', Qara Mts, Fuzul, 1350 ft, 18.xi.1930 (*B. S. Thomas*).

dioscoris (*Teddia*) Burr, 1899 : 43. Holotype ♂, [SOUTHERN YEMEN:] Sokotra, Dahamish, 21.xii.1898 (*Dr H. O. Forbes & W. R. Ogilvie-Grant*).

dispar (*Hierodula*) Kirby, 1900 : 146. 1 ♂ syntype, CHRISTMAS IS.: West Coast, x.1897 (*C. W. Andrews*); 1 ♀ syntype, CHRISTMAS IS.: neighbourhood of Flying Fish Cove, 20.ix-20.x.—(*C. W. Andrews*); 3 ♀ & 1 nymphal ♀ syntypes, CHRISTMAS IS.: (*C. W. Andrews*); 1 ♀ 'pupa-skin' syntype, CHRISTMAS IS.: Flying Fish Cove (*C. W. Andrews*).
3 ♂, 2 ♀ syntypes are missing.

distanti (*Solygia* (?) Kirby, 1899 : 350. 1 ♂ syntype, [SOUTH AFRICA:] Barberton (*P. Rendall*); 1 ♂, 2 ♀ syntypes [SOUTH AFRICA:] Zululand (*Rev. W. H. Heale*).

distinctus (*Oxypilus*) Beier, 1930b : 447. Holotype ♂, SIERRA LEONE: Moyamba, 29.i.1925 (*E. Hargreaves*).

distinguenda (*Hoplocorypha*) Beier, 1930b : 444. Holotype ♂, NIGERIA: 'N. Nigeria', Azare, vi.1924 (*Dr Ll. Lloyd*).

doriana (*Rhombodera*) Laidlaw, 1931 : 88. Holotype ♂, [INDIA:] Behar, Ranchi, iii.1928 (*W. B. R. Laidlaw*).

dyaka (*Hierodula*) Westwood, 1889 : 34. Holotype ♂, [?INDONESIA:] 'Borneo', 'Westw. Mantd. pl. 6, f. 4'.

enei (*Oxypilus* (*Oxypilus*)) Roy, 1966 : 1440. Holotype ♂, NIGERIA: Western Prov., 3½ mls N. of Oyo, near Idode, 16.xii.1960.

evansi (*Microthespis*) Uvarov, 1931a : 418. Holotype ♂, [PAKISTAN:] Baluchistan, Quetta, 27.vii-8.viii.1929 (*J. W. Evans*).

exilis (*Micrentella*) Giglio-Tos, 1915c : 180. Holotype ♂, [?SOUTH AFRICA:] 'S'tn.' [Simons-town?], ii.1892.

eximia (*Callimantis*) Pascoe, 1882 : 423. 1 ♀ syntype, [BRAZIL:] Pará, near Nazaré (*F. P. Pascoe*); 1 ♀ syntype, VENEZUELA.

Pascoe describes the single specimen which he collected in Brazil, and adds that in the British Museum the species bears the manuscript name '*Callimantis venezuelae* Bates'; the single ♀ from Venezuela bears this label.

fallax (*Calidomantis*) Giglio-Tos, 1917 : 49. 1 ♂ syntype, KENYA: 'B.E.A.', Nairobi, 20.iii.1906 (*W. L. Sclater*) [abdomen missing]; 1 ♀ syntype, [KENYA:] 'Brit. E. Africa', Narossura R. (*W. P. Lowe*).

fasciata (*Pyrgomantis*) Giglio-Tos, 1917 : 106. 2 ♂ syntypes, [ZAIRE:] S.E. Katanga, 29.xi.1907 (Neave Coll.) [abdomen missing on one specimen, head missing on the other].

feminina (*Miomantis*) Beier, 1930b : 451. Holotype ♀, ETHIOPIA: 'Abyssinia', Abbai Affat, v-vi.1902 (*Degen*) [right elytron missing].

- femorata (Musonia)** Saussure & Zehntner, 1894 : 166. Holotype ♀, NICARAGUA: Chontales (Janson) [tip of abdomen missing].
- fenestrata (Mantis)** Fabricius, 1781 : 349. Holotype ♂, SOUTH AFRICA: 'S. Africa', 'Africa aequinoctiali' [published information].
In the Banks Collection, BMNH.
- ferus (Mionyx)** Saussure & Zehntner, 1894 : 167. Holotype ♂, [PANAMA:] V. de Chiriqui, 25-4000 ft, 'figuré' (*Champion*) [tip of abdomen missing].
- festae (Stauromantis)** Giglio-Tos, 1917 : 55. 1 ♂ syntype, ECUADOR: Guayaquil (*Rosenberg*). 1 ♀ syntype in the MIZSU, Turin.
- fraseri (Eremiaphila)** Uvarov, 1921 : 175. Holotype ♀, [IRAQ:] Mesopotamia, R. Euphrates, Anah, "'Lived 10 days in captivity, with nothing to eat or drink. A few seen in desert; run very fast.'" (Note by collector)', 15.vii.1920 (*A. D. Fraser*).
- fraseri (Pararivettina)** Beier, 1931 : 361. Holotype ♂, INDIA: Nilgiris [published as 'Nilgiri Hills'], 1922 (*Lt. Col. F. C. Fraser*).
- fraterna (Acontista)** Saussure & Zehntner, 1894 : 136. Holotype ♀, COSTA RICA: Cache (*H. Rogers*).
- fraterna (Stagmomantis)** Saussure & Zehntner, 1894 : 144. 1 ♂ syntype, [MEXICO:] Tabasco, Teapa, iv.— (*H. H. Smith*); 1 ♀ syntype, BELIZE: 'B. Honduras', R. Sarstoon, 'figuré' (*Blancaneaux*); 1 ♀ syntype, BELIZE: 'British Honduras' (*Blancaneaux*).
Additional syntype(s) in the MHN, Geneva and the IZPAN, Warsaw.
- fratricida (Hierodula (Rhombodera))** Wood-Mason, 1878 : 581. Holotype ♂, [no data] [INDIA:] Malabar [published information].
- fuliginosa (Cimantis)** Werner, 1931 : 1330. Holotype ♂, [INDIA:] Madras, Anamalai Hills, 2400 ft, (46), 5.v.1930 [published in error as '6.v.1930'] (*J. C. M. Gardner*).
- fumosa (Cimantis)** Giglio-Tos, 1915c : 155. Holotype ♂, [INDIA:] Darjeeling.
- fumosa (Hoplocorypha)** Giglio-Tos, 1916 : 11. 1 ♀ syntype, ZAMBIA: 'N.E. Rhodesia', Mid-Luangwa Vy., 3-1800 ft, 23-31.viii.1910 (*S. A. Neave*) [abdomen missing].
The ♂ syntype is missing.
- fumosus (Thrinaconyx)** Saussure & Zehntner, 1894 : 179. 1 ♂ syntype, [PANAMA:] V. de Chiriqui, 2-3000 ft, 'figuré' (*Champion*); 3 ♂ syntypes, [PANAMA:] V. de Chiriqui, 2-3000 ft (*Champion*).
- fusca (Bantiella)** Giglio-Tos, 1915c : 187. 1 ♂ syntype, TRINIDAD: Port of Spain, 30.i.1912 (*G. A. K. Marshall*); 1 ♀ syntype, TRINIDAD: Port of Spain (*H. Caracciola*).
- fusca (Gonypetella)** Giglio-Tos, 1915c : 144. 1 ♂ syntype, UGANDA: Entebbe, 20.vii.1911 (*C. C. Gowdey*).
1 ♂ syntype in the MRAC, Tervuren.
- gardneri (Deiphobella)** Werner, 1935 : 496. Holotype ♂, [INDIA:] U.P., Chakata Range, Haldwani, (95), 1.v.1930 (*S. N. Chatterjee*).
- gardneri (Memantis)** Werner, 1931 : 1331. 1 ♂ syntype, [INDIA:] Tarakhat, (26), v.1919 (Student's Coll.).
1 ♂ syntype in the FRI, Dehra-Dun.
- garuana (Hoplocorypha)** Giglio-Tos, 1916 : 15. 1 ♂ syntype, NIGERIA: 'N. Nigeria', Sokoto Dist., xii.1910 (*C. E. S. Watson*); 1 ♂ syntype, NIGERIA: 'N. Nigeria', Baro, 30.x.1910

(*Dr W. Morrison*) [head, pronotum and forelegs missing]; 1 nymphal ♀ syntype, LIBERIA: (*W. P. Lowe*) [abdomen missing].

1 nymphal ♀ syntype missing; additional syntypes in the MNHU, Berlin and the MCSN, Genoa.

gigas (Acithespis) Giglio-Tos, 1916 : 43. Holotype ♂, NIGERIA: 'N. Nigeria', Zungeru, x-xi.1910 (*J. W. Scott-Macfie*).

gigas (Eremiaphila) Beier, 1930b : 432. Holotype ♀, SUDAN: 'Sudan Govt.', Nikeila, i.xii.1927 (*Mr Shaw*).

godmani (Acanthops) Saussure & Zehntner, 1894 : 181. Holotype ♂, [BELIZE:] Belize, 'figuré' (*Blancaneaux*).

gracilicollis (Parasphendale) Beier, 1930b : 449. Holotype ♂, KENYA: 'Brit. E. Africa', E. Lake Baringo (*R. Ford*).

gracilicollis (Sphodromantis) Beier, 1930b : 452. 4 ♂, 1 ♀ syntypes, GHANA: 'Gold Coast', Bibianaha, ix-xii.1909 (*Dr Spurrell*).

The ♀ and 1 ♂ were listed and labelled by Beier as 'types', but the description was based on these two specimens and 4 ♂ 'paratypes', of which one is missing.

gracilis (Brunneria) Giglio-Tos, 1915b : 69. 1 ♂ syntype, BRAZIL: Parana (*E. Dukinfield Jones*).

Additional syntypes in the MNHU, Berlin and MCSN, Genoa.

gracilis (Neocilnia) Beier, 1930b : 450. Holotype ♀, [SOUTH AFRICA:] Cape Province, Ceres, iii.1925 (*R. E. Turner*).

gracilis (Orthodera) Giglio-Tos, 1917 : 107. 1 ♂, 2 ♀ syntypes, AUSTRALIA: Killalpanima, 100 miles E. of L. Eyre (*H. J. Hillier*).

grandis (Acromantis) Beier, 1930b : 454. Holotype ♀, [VIETNAM (NORTH):] Tonkin, Thanh-Moi, vi-vii.— (*H. Fruhstorfer*).

gryps (Harpagonyx) Saussure & Zehntner, 1894 : 176. 1 ♂ syntype, [GUATEMALA:] Vera Paz, Pancina [published in error as 'Panima'], 'figuré' (*Champion*).

Additional syntype(s), depository not named.

guichardi (Hypsicorypha) La Greca, 1952 : 52. Holotype ♂, SOMALI REPUBLIC: 'Brit. Somaliland', Biyo Dader, 15.iii.1949 (*K. M. Guichard*).

harpyia (Hierodula) Westwood, 1889 : 35. Holotype ♀, SRI LANKA: 'Ceylon', 'Westw. Mon. Mantd. pl. 5, f. 3'.

henryi (Pezomantis) Uvarov, 1927a : 87. Holotype ♀, SRI LANKA: 'Ceylon', Hakgalla, 4.iv.1924 (*G. M. Henry*).

heterogamia (Stagmomantis) Saussure & Zehntner, 1894 : 142. 1 ♂, 1 ♀ syntypes, [PANAMA:] Bugaba, 800-1500 ft, 'figuré' (*Champion*); 1 ♂ syntype, [PANAMA:] Bugaba, 800-1500 ft (*Champion*).

heteromorpha (Oxyelaea) Beier, 1930b : 433. Holotype ♂, KENYA: 'B. E. Africa', Maziwa Mitatu & Maungu, 14.iii & 4.iv.1897 (*C. S. Betton*).

incisa (Deiphobe) Werner, 1933 : 900. 1 ♂ syntype, [INDIA:] U.P., Chakata Range, Haldwani, at light, (57), 20.vi.1930 (*S. N. Chatterjee*) [published in error as '(47)' and 'N. C. Chatterjee']. 1 ♂ and 1 ♀ syntypes in the FRI, Dehra-Dun.

indica (Amorphoscelis) Giglio-Tos, 1915b : 33. Holotype ♂, INDIA: Ratnagiri (*Dr Jayakar*).

indica (Deiphobe) Giglio-Tos, 1916 : 25. Holotype ♀, INDIA: Mhow.

indica (*Leptomantis*) Giglio-Tos, 1915b : 89. See page 311.

inermis (*Fischeria*) Uvarov, 1922 : 353. Holotype ♂, SAUDI ARABIA: 'S. W. Arabia', El Kubar (G. W. Bury).

infusca (*Pseudomiopteryx*) Saussure & Zehntner, 1894 : 163. 1 ♂ syntype, [PANAMA:] V. de Chiriqui, 2–3000 ft, 'figuré' (*Champion*); 1 ♂ syntype, MEXICO: Cordova (*Hoegel*); 1 ♂ syntype, [GUATEMALA:] V. de Atitlan, 2500–3500 ft (*Champion*); 1 ♂ syntype, [PANAMA:] Bugaba, 800–1500 ft (*Champion*).

Additional syntypes, depository not named.

inquinata (*Acontista mexicana* var.) Saussure & Zehntner, 1894 : 136. 1 ♂ syntype, MEXICO: Cordova, 'figuré' (*Hoegel*); 1 ♂ syntype, [MEXICO:] Guerrero, Acaguizotla, 3500 ft, x.— (*H. H. Smith*).

Additional syntype(s), depository not named.

insignis (*Phyllocrania*) Westwood, 1843 : 51. 1 ♀ syntype, SIERRA LEONE: 'Westw. Arc. Ent. t. 62, f. 1' (*Revd. D. F. Morgan*).

1 ♀ syntype missing, 1 ♀ syntype in the UM, Oxford.

iridipennis (*Miopteryx*) Westwood, 1889 : 38. 1 ♀ syntype, INDIA: 'Ind. ?' [abdomen missing]; 1 ♀ syntype ?, INDIA: 'S. Ind.'.

Additional syntype(s) in the UM, Oxford.

jonesi (*Pyrgomantis*) Kirby, 1904a : 83. Lectotype ♂, NIGERIA: 'S. Nigeria' (*Dr S. A. Jones*); designated by Roy (1967 : 1542).

Paralectotypes. 3 ♂, data as lectotype.

judithae (*Congoharpax*) Roy, 1972b : 863. Holotype ♂, NIGERIA: 'N. Nigeria', Zaria, Samaru, m.v. trap, 9.v.1966 (*J. C. Deeming*).

kilimandjarica (*Miomantis*) Sjöstedt, 1909 : 64. 1 ♂ syntype, [TANZANIA:] Kilimandjaro, ix.1905–6 (*Sjöstedt*); 1 ♂ syntype, [TANZANIA:] Kilimandjaro, Kibonoto, 1300–1900 m, 24.iv.1905–6 (*Sjöstedt*); 1 ♀ syntype, [TANZANIA:] Kilimandjaro, 12.ix.1905–6 (*Sjöstedt*).

Additional syntypes in the NR, Stockholm.

kimberleyensis (*Truxomantis*) Sjöstedt, 1918 : 33. 1 ♂ syntype, AUSTRALIA: 'N. V. Austr.', Kimberley District, ii.1910–1913 (*Mjöberg*) [tip of abdomen missing].

9 ♂, 1 ♀ syntypes in the NR, Stockholm.

laevifrons (*Eremiaphila*) Uvarov, 1922 : 351. Holotype ♀, OMAN: 'Arabia', Muscat (*A. S. G. Jayakar*).

laosana (*Humbertiella*) Beier, 1930b : 434. Holotype ♀, LAOS: 'French Laos', Bandat (*J. F. Godfrey*).

Beier gives the date as '1920–24', misinterpreting the registration number of '1920–24'.

lateralis (*Cliomantis*) Hinton, 1939 : 284. Holotype ♂, [AUSTRALIA:] N. Queensland, Flinders R., Glendower Stn, 1700 ft, 12.xi.1923 (*G. H. Wilkins*) [head missing].

laticollis (*Pseudoharpax*) Beier, 1930b : 458. Holotype ♀, [RHODESIA:] Mashonaland, Salisbury, xi.1899 (*G. A. K. Marshall*).

laurifolia (*Phyllomantis*) Saussure, 1892 : 124. Holotype ♀, PANAMA: Bugaba, 'figuré' (*Champion*).

liliputana (*Haldwania*) Beier, 1930b : 441. Holotype ♂, INDIA: Haldwani Dist. [published in error as 'Haldwania Dist.'], Kumaon, 1923 (*H. G. Champion*).

limbata (*Sibylla*) Giglio-Tos, 1915b : 92. 1 ♂ syntype, GHANA: 'Gold Coast', Bibianaha, 700 ft, 1912 (*H. G. F. Spurrell*).

1 ♀ syntype in the MNHU, Berlin.

lobata (Mantis) Fabricius, 1781 : 350. Holotype ♀, [no data] [SOUTH AFRICA:] 'ad Cap. bon. sp.' [published information].

In the Banks Collection, BMNH.

lobipes (Parastagmatoptera) Redtenbacher, 1892 : 206. Holotype ♂, WEST INDIES: 'W.I.', St. Vincent, S. end of island, open swampy land near sea, beaten from bushes, 27.ix.—(H. H. Smith).

longipennis (Amantis) Beier, 1930b : 439. Holotype ♂, [VIETNAM (NORTH):] Tonkin, Bao Ha, x-xii.1923 (H. Stevens).

lowi (Bolbe) La Greca, 1969 : 636. Holotype ♂, AUSTRALIA: 'N. Australia', Queensland, nr Cairns, Yorkeys Knob, 4.ix.1966 (A. Walford-Huggins).

lucubrans (Mantis) Burchell, 1822 : 418, 465. LECTOTYPE ♂, [no data] SOUTH AFRICA: near Klaarwater (W. J. Burchell) [published information], here designated.

Burchell gives the species description on p. 465, but has previously named the species on p. 418, where he also states that he 'never took more than five'. Although the single specimen has been regarded as a holotype, it is now designated as the lectotype as other specimens may still be in existence.

luteola (Mantoida) Westwood, 1889 : 28. 1 ♂ ? syntype, [BRAZIL:] Santarem [abdomen missing].

Additional syntype(s) in the UM, Oxford.

mabirica (Plistospilota) Giglio-Tos, 1917 : 61. Holotype ♂, UGANDA: 'Uganda Prot.', Mabira Forest, Chagwe, 3500–3800 ft, 16–25.vi.1911 (S. A. Neave).

maculata (Hapalopeza) Kirby, 1904a : 84. 1 ♂ syntype, SRI LANKA: 'Ceylon', Kaltura, ii.1895 (E. E. Green) [no mid or hind legs]; 1 ♀ syntype, SRI LANKA: 'Ceylon', Dickoya, i.xii.1881.

Further syntypes may exist, as Kirby does not state the number of specimens seen but mentions 'some' specimens.

maculata (Junodia) Roy, 1972a : 566. Holotype ♂, ZAMBIA: 'N. Rhodesia', N'Changa (C. T. Macnamara).

madagascariensis (Idolomorpha) Westwood, 1889 : 46. 1 ♀ syntype, MADAGASCAR: 'Westw. Mantd. pl. 6, f. 7.' [abdomen missing].

Additional syntypes(s) in the UM, Oxford.

malayana (Xanthomantis) Beier, 1932 : 150. Holotype ♂, MALAYSIA: 'Malay Penin.', Selangor, Bukit Kutu, 3500 ft, at light, 13.iv.1926 (H. M. Pendlebury).

malayensis (Psychomantis) Beier, 1932 : 152. Holotype ♂, MALAYSIA: 'Malay Penin.', Kedah Peak, 3300 ft, [published as 'at light'] 24.iii.1928 (H. M. Pendlebury).

maroccana (Ameles) Uvarov, 1930b : 210. Holotype ♀, MOROCCO: Ifrane, viii. 1930 (Miss A. Mackie).

maya (Harpagonyx) Saussure & Zehntner, 1894 : 176. Holotype ♂ ?, [MEXICO:] N. Yucatan, Temax (Gaumer) [abdomen missing].

maya (Liturgousa cayennensis var.) Saussure & Zehntner, 1894 : 160. 2 ♂, 1 ♀ syntypes, [MEXICO:] N. Yucatan, Temax (Gaumer).

maya (Mantoida) Saussure & Zehntner, 1894 : 125. 2 ♀ syntypes, [MEXICO:] N. Yucatan, Temax (Gaumer).

maya (Stagmomantis) Saussure & Zehntner, 1894 : 145. 1 ♀ syntype, BELIZE: 'British Honduras' (Blancaneaux); 1 ♀ syntype, [MEXICO:] N. Yucatan, Temax (Gaumer).

1 ♂ syntype in the IZPAN, Warsaw.

maya (*Theoclytes*) Saussure & Zehntner, 1894 : 192. 1 ♂ syntype, [MEXICO:] Tabasco, Teapa, iv.— (*H. H. S.*); 1 ♀ syntype, [MEXICO:] N. Yucatan, Temax (*Gaumer*).

media (*Diamusonia*) Giglio-Tos, 1916 : 7. 1 ♂ syntype, TRINIDAD (*P. Rendall*).
2 ♀ syntypes in the MNHU, Berlin.

media (*Photina*) Giglio-Tos, 1915*b* : 73. 1 ♀ syntype, BRAZIL: Parana (*E. Dukinfield Jones*).
The ♂ syntype from Paraguay is missing.

meggitti (*Paratoxodera*) Uvarov, 1927*b* : 658. Holotype ♂, BURMA: (*F. J. Meggitt*).

mexicana (*Acontista*) Saussure & Zehntner, 1894 : 135. 1 ♀ syntype, [PANAMA:] Bugaba, 800–1500 ft (*Champion*); 1 ♀ syntype, [MEXICO:] Vera Cruz, Atoyac (*Schumann*); 1 ♀ syntype, [GUATEMALA:] V. de Chiriqui, 2–3000 ft (*Champion*).

There are also 3 ♀ with identification labels by Saussure and similar data to the above ♀ from Guatemala, except for a different collection height of 'below 4000 ft.' Only '2–3000 ft' is mentioned in the description and these specimens have therefore not been regarded as syntypes.

Additional ♀ syntypes, depository not named.

mexicanus (*Oligonyx*) Saussure & Zehntner, 1894 : 172. 1 ♂ syntype, MEXICO: Presidio, 'figuré' (*Forrer*); 1 ♂ syntype, [GUATEMALA:] Vera Paz, Cubulco (*Champion*).

micans (*Amorphoscelis*) Beier, 1937*b* : 177. Holotype ♂, [MALAYSIA:] Sarawak, Mt Dulit, 4000 ft, moss forest, house clearing, sheet (light), 8 p.m.–10 p.m., 29.x.1932 (Oxford Univ. Exp. *B. M. Hobby* & *A. W. Moore*).

microptera (*Eremoplana*) Westwood, 1889 : 32. 1 ♀ syntype, [INDIA:] Burdwan, 'Westw. Mantd. pl. 3, f. 5.' (*Hardwicke Bequest*); 1 ♀ syntype, [INDIA:] Burdwan (*Hardwicke Bequest*); 1 ♀ syntype, NEPAL: 'India' (*Hardwicke Bequest*).

ministralis (*Mantis*) Fabricius, 1775 : 277. 1 ♂ syntype, AUSTRALIA; 2 ♀ syntypes, [no data] [AUSTRALIA:] 'nova Hollandia' [published information] [one specimen with abdomen pinned separately and elytra missing, the other with abdomen missing, elytra and wings broken short].

In the Banks Collection, BMNH.

minor (*Archimantis*) Giglio-Tos, 1917 : 43. 1 ♀ syntype?, [AUSTRALIA:] King George's Sound [published as 'Kings River']; 1 ♀ syntype?, [AUSTRALIA:] Swan River [published as 'Kings River'].

Neither of the above specimens bears the usual hand-written identification label by Giglio-Tos, but it is possible that one or both of the specimens is syntypic.

1 ♂ syntype in the MNHU, Berlin.

minor (*Blepharodes cornuta*) Kevan, 1954 : 471. Holotype ♀, KENYA: N.P., Mt Kulal, 5500–6000 ft, 02°35' N, 36°55' E, x.1947 (*J. G. Williams*).

minor (*Memantis*) Werner, 1931 : 1330. Holotype ♂, [INDIA:] Madras, Vizagapatam, (28), xii.1928 (*E. A. Glennie*).

minuta (*Coptopteryx*) Giglio-Tos, 1915*b* : 69. Holotype ♀, CHILE: 'Chili', (*R. M. Middleton*).

monstrosa (*Archimantis*) Wood-Mason, 1878 : 583. Holotype ♀, AUSTRALIA: 'North Australia', Victoria River, 10.iii.1856 (*I. R. Elsey*).

monstrosus (*Tarachodes*) Giglio-Tos, 1917 : 97. 1 ♂ syntype, UGANDA: Palebek, 24.ii.1913 (*W. P. Lowe*); 1 ♀ syntype, SOMALI REPUBLIC: 'Brit. Somaliland' (*R. E. Drake-Brockman*) [abdomen missing].

montana (*Polyspilota*) Beier, 1931 : 360. Holotype ♀, ETHIOPIA: 'Abyssinia', Djem-Djem, circa 8000 ft, 6.x.1926 (*Dr H. Scott*).

- montana** (*Stagmomantis*) Saussure & Zehntner, 1894 : 146. 1 ♂ syntype, [GUATEMALA:] V. de Atitlan, 2500–3000 ft, 'figuré' (*Champion*) [abdomen missing]; 1 ♂ syntype, [GUATEMALA:] V. de Atitlan, 2500–3000 ft (*Champion*); 1 ♂ syntype, [MEXICO:] Guerrero, Chilpancingo, 4000 ft, vi.—(*H. H. Smith*); 1 ♀ syntype, [MEXICO:] Guerrero, Acapulco, ix.—(*H. H. Smith*); 1 ♀ syntype, [MEXICO:] Guerrero, Tepetlapa, 3000 ft, x.—(*H. H. Smith*).
- montanus** (*Muscimantis*) Henry, 1931 : 124. Holotype ♂, SRI LANKA: 'Ceylon', Ohiya, 6800 ft, 20.iv.1928 (*G. M. Henry*).
- nana** (*Iris*) Uvarov, 1930a : 632. Holotype ♂, IRAQ: (Baghdad ?) (*O. Theodor*) [abdomen missing].
- natalica** (*Miomantis*) Beier, 1930b : 450. Holotype ♂, [SOUTH AFRICA:] Natal, Durban, 5.iv.1894 (*H. W. Whyte*).
- nebulosa** (*Sinarella*) Uvarov, 1924 : 3. Holotype ♂, [ISRAEL]: N. Sinai, Mohammedia, 23.x.1916 (*A. W. Boyd*).
- nicaraguae** (*Macromantis ovalifolia* var.) Saussure & Zehntner, 1894 : 150. Holotype ♂, NICARAGUA: Chontales (*Janson*).
- nigerica** (*Hoplocorypha*) Beier, 1930b : 446. Holotype ♂, NIGERIA: 'N. Nigeria', Azare, vi.1924 (*Dr Ll. Lloyd*).
- nigerica** (*Plistospilota*) Giglio-Tos, 1917 : 61. Holotype ♀, NIGERIA: 'N. Nigeria', Antipa, 6.i.1911 (*J. J. Simpson*).
- nigerica** (*Pyrogomantis*) Giglio-Tos, 1917 : 105. Holotype ♂, NIGERIA: 'N. Nigeria', Zungeru, x-xi.1910 (*J. W. Scott-Macfie*).
- nigericus** (*Oxypilus*) Beier, 1930b : 447. Holotype ♂, NIGERIA: 'N. Nigeria', Azare, 1925 (*Dr Ll. Lloyd*).
- nigericus** (*Paragalepsus*) Beier, 1930b : 435. Holotype ♂, NIGERIA: 'N. P. Nigeria', Akwanga Div., Mama Dist., ii. 1928 (*Dr Ll. Lloyd*).
- nigericus** (*Paroxyophthalmus*) Giglio-Tos, 1917 : 104. 2 ♂ syntypes, NIGERIA: 'N. Nigeria', Zungeru, x-xi.1910 (*J. W. Scott-Macfie*).
- nigericus** (*Pseudoharpax*) Giglio-Tos, 1915b : 105. 1 ♂ syntype, NIGERIA: 'N. Nigeria', Baro, 30.x.1910 (*Dr W. Morrison*); 1 ♂ syntype, SIERRA LEONE: 'Protectorate', 1911 (*Dr H. E. Arbuckle*); 1 ♀ syntype, NIGERIA: 'N. Nigeria', Kogin Sirikin, Pawa, 8.xii.1910 (*J. J. Simpson*).
- nigericus** (*Sigerpes*) Giglio-Tos, 1915a : 13. 1 ♂ syntype, NIGERIA: 'S. Nigeria', Cross River, Afikpo, 7.vi.1910 (*J. J. Simpson*).
1 ♂ syntype in the MNHU, Berlin.
- nigriventer** (*Amorphoscelis*) Beier, 1930b : 432. Holotype ♂, GHANA: 'Gold Coast', Bibianaha, ix-xii.1909 (*Dr. Spurrell*).
- nigropicta** (*Theopompa*) Westwood, 1889 : 29. 1 ♂ syntype, [no data] AUSTRALIA [published information], 'Westw. Mantd. pl. 2, f. 6'.
Additional syntype(s) in the UM, Oxford.
- nilotica** (*Oxythespis*) Giglio-Tos, 1916 : 42. Holotype ♂, [SUDAN or ETHIOPIA:] Blue Nile (*E. S. Crespin*) [abdomen missing].
- niloticus** (*Sigerpes*) Giglio-Tos, 1915a : 12. Holotype ♂, [SUDAN:] 'Egypt', White Nile (*L. Loat*).
- nilulensis** (*Galepsus*) Giglio-Tos, 1917 : 101. 1 ♀ syntype, NIGERIA: 'N. Nigeria', Baro, 14–16.x.1910 (*J. J. Simpson*).
2 ♂ syntypes in the MCSN, Genoa and 1 ♂ syntype in the MNHU, Berlin.

nordica (*Stagmomantis*) Giglio-Tos, 1917 : 53. 1 ♂, 1 ♀ syntypes, [U.S.A.]: 'Am Bor', 'Virga.' (Fry Coll.).

nova (*Plistospilota*) Beier, 1930b : 452. Holotype ♀, [INDIA:] Cachar (*W. Grant*).

Beier quoted '18.x.—' as the date of collection, misinterpreting the handwritten label '78-70', which is the registration number 1878-70.

obesa (*Trachymantis*) Giglio-Tos, 1917 : 46. Holotype ♀, AUSTRALIA: Central Australia, Hermannsburg (*H. J. Hillier*).

obscura (*Cliomantis*) Hinton, 1939 : 286. Holotype ♀, AUSTRALIA: 'W. Australia', Merredin [published in error as 'Merreden'], 13.xii.1935 (*R. E. Turner*).

obscura (*Mantis*) Fabricius, 1781 : 349. Holotype ♂, 'AFRICA': 'Africa aequinoctiali' [published information].

In the Banks Collection, BMNH.

occidentalis (*Galinthias*) Beier, 1930b : 456. Holotype ♀, SIERRA LEONE: Njala [published in error as 'Njaba'], xii.1926 (*E. Hargreaves*).

occidentalis (*Pyrgomantis*) Giglio-Tos, 1917 : 105. 1 ♂ syntype, NIGERIA: 'N. Nigeria', Minna, i.1910 (*Dr. J. W. S. Macfie*).

1 ♂ syntype in the MNHU, Berlin.

occidentalis (*Sigerpes*) Wood-Mason, 1879 : 259. Holotype ♂, [no data] SIERRA LEONE [published information].

occipitalis (*Hapalopeza*) Westwood, 1889 : 36. 1 ♂, 1 ♀ syntype, HONG KONG; 1 ♂ syntype, HONG KONG [only abdomen and metathorax with hind wings and left hind leg].

Additional syntype(s) in the UM, Oxford.

ocellata (*Statilia*) Uvarov, 1922 : 353. Holotype ♀, [PAKISTAN:] Quetta.

ocularis (*Litaneutria*) Saussure, 1892 : 124. Holotype ♂, MEXICO: N. Sonora (*Morrison*) [hind legs missing].

oculata (*Mantis*) Fabricius, 1781 : 348. Holotype ♂, 'AFRICA': 'Africa aequinoctiali' [published information] [abdomen missing].

In the Banks Collection, BMNH.

orientalis (*Bolbena*) Beier, 1930a : 196. Holotype ♂, SOMALI REPUBLIC: 'British Somaliland', Buran, 3000 ft, 10°13' N, 48°47' E, 19.xii.1929 (*C. L. Collette*).

orientalis (*Heterochaeta*) Kirby, 1904a : 87. 1 ♀ syntype, 'E. AFRICA'; 1 ♂ ? syntype, 'AFR. OR.': Luitpoldkette (*Janson*) [abdomen missing]; 1 nymphal syntype, 'E. AFR.' [abdomen missing].

The ♀ syntype bears an incorrect registration number, 1892-22 (referring to '3 galls on oak, S. Spain'); the next entry in the Register, 1892-23 includes '1 Mantis' from 'E. Africa (German)', and is probably the correct registration number for the specimen.

orientalis (*Metentella*) Giglio-Tos, 1915c : 178. 3 ♂ syntypes, MOZAMBIQUE: 'Port. E. Africa', Valley of Kola R., nr E. Mt Chiperrone, 1500-2000 ft, 6.iv.1913 (*S. A. Neave*); 1 ♂ syntype, MALAWI: 'Nyasaland', S.E. shore L. Nyasa, btwn Ft Maquire & Fort Johnston, 6-17.iii.1910 (*S. A. Neave*) [head, pronotum and forelegs missing].

Additional syntypes in the MNHU, Berlin.

orientalis (*Oligomantis*) Giglio-Tos, 1915a : 4. 1 ♂ syntype, SINGAPORE (*H. N. Ridley*).

1 ♀ syntype in the MNHU, Berlin and 1 ♀ syntype in the MCSN, Genoa.

oxynotus (*Tarachodes*) La Greca, 1952 : 6. Holotype ♀, SOMALI REPUBLIC: 'Somaliland', Hargeisa, 09°33' N, 44°03' E, i.1947 (*W. H. Wood*).

- oxyops** (*Metacromantis*) Beier, 1930b : 455. Holotype ♀, SRI LANKA: 'Ceylon', Haragama, 18.vii.1910 (E. E. Green).
- oxyops** (*Paragalepsus*) Beier, 1930b : 436. Holotype ♂, UGANDA: Kamule, 20.xii.1921 (H. Hargreaves).
- pallida** (*Beesoniella*) Werner, 1935 : 498. Holotype ♂, [INDIA:] Madras, Amarampalam R. Nilambur, (94), 12.iv.1933 (C. F. C. Beeson).
- pallida** (*Pyrgomantis*) Giglio-Tos, 1917 : 106. 1 ♂ syntype, GHANA: 'Gold Coast', N. Territories, 6.v.1913 (Jas. J. Simpson).
- palmonii** (*Xenomantis*) Uvarov, 1939b : 219. Holotype ♀, JORDAN: 'Palestine', E. bank of R. Jordan, Lake Genazareth, 620 ft below sea, 1938 (J. Palmoni).
- parumspinosus** (*Blepharodes*) Beier, 1930b : 460. 1 ♂ syntype, NIGERIA: 'N. Nigeria', Azare, 1925 (*Dr Ll. Lloyd*); 1 ♀ syntype, NIGERIA: 'N. Nigeria', Azare, 1926 (*Dr Ll. Lloyd*).
The above syntypes were listed and labelled by Beier as 'types', but the description of the species was based on these specimens plus 1 ♂ 'paratype' with the same data and 1 ♀ 'paratype' from the Sudan, both of which are missing. Two further specimens with the same locality and collector as the 'types' but different collection dates are present, but were not included in the description.
- parva** (*Camelomantis*) Beier, 1932 : 151. Holotype ♂, MALAYSIA: 'Malay Penin.', Kedah Peak, 3300 ft, 27.iii.1928 (H. M. Pendlebury).
- parva** (*Leptomantis*) Werner, 1933 : 899. 1 ♂ syntype, [INDIA:] Dehra Dun, Student's Coll., (68), 15.ix.1925.
1 ♂, 1 ♀ syntype in the FRI, Dehra-Dun.
- parva** (*Oxyothespis*) Beier, 1937a : 378. Holotype ♂, UGANDA: Turkana Prov., v.1934 (D. R. Buxton) [abdomen missing].
- pauperata** (*Mantis*) Fabricius, 1781 : 346. Holotype ♀, [no data] [INDIA:] Coromandel [published information] [head and abdomen missing].
In the Banks Collection, BMNH.
- pectoralis** (*Rhombodera*) Westwood, 1889 : 33. Holotype ♀, [no data] PAPUA NEW GUINEA: 'Papua' [published information].
- penangica** (*Camelomantis*) Giglio-Tos, 1917 : 67. 2 ♂ syntypes, [MALAYSIA:] Penang Hills, 1800–2500 ft, iii.1898 (S. S. Flower); 1 ♂ syntype, [MALAYSIA:] Penang Hills, 2000–2500 ft, iii.1898 (S. S. Flower); 1 ♂ syntype, [MALAYSIA:] Penang, 2260 ft, 25.xi.1896 (S. Flower); 4 ♂ syntypes, [MALAYSIA:] Penang.
1 ♀ syntype, depository not named.
- persa** (*Iris*) Uvarov, 1922 : 355. 1 ♂ syntype, [IRAN:] Bushire, viii.1890 (W. D. Cumming); 1 ♂ syntype, [IRAN:] Bushire, 4.ix.1890 (W. D. Cumming); 1 ♂ syntype, [IRAN:] Bushire, ix.1890 (W. D. Cumming); 1 ♂ syntype, [IRAN:] Bushire (W. D. Cumming).
Uvarov incorrectly states that all the specimens were collected in September, 1890.
- peruviana** (*Liturgusa*) Giglio-Tos, 1915b : 77. Holotype ♀, PERU: Paleazu.
- philbyi** (*Attalia*) Uvarov, 1936a : 533. Holotype ♂, SAUDI ARABIA: 'Arabia', S. Hedjaz, Ashaira, 12.viii.1931 (H. St J. B. Philby).
- philippina** (*Amantis*) Giglio-Tos, 1915c : 152. Holotype ♂, PHILIPPINES (C. S. Banks).
- philippina** (*Haantia*) Giglio-Tos, 1915b : 200. Holotype ♂, PHILIPPINES (C. S. Banks).
- picea** (*Hoplocorypha*) Giglio-Tos, 1916 : 10. 1 ♂, 1 ♀ syntypes, [KENYA:] 'Brit. E. Africa', Narossura R. (W. P. Lowe).

pilosella (*Metriomantis*) Giglio-Tos, 1915b : 70. See page 311.

planivertex (*Miomantis*) Sjöstedt, 1909 : 64. 1 ♂ syntype, [TANZANIA:] Meru, 'Nieder', Ngare na nyuki, i.— (*Sjöstedt*) [abdomen and hind legs missing].
2 ♂, 2 ♀ syntypes in the NR, Stockholm.

pluviusilvae (*Aetaella*) Henry, 1931 : 126. Holotype ♂, SRI LANKA: 'Ceylon', Ratnapura' 16.ix.1929, 'Reared to maturity in Colombo, 4.ii.1930' (*G. M. Henry*).

punctata (*Gonypetella*) Giglio-Tos, 1915c : 144. 1 ♂ syntype, UGANDA: 'Uganda Prot.', Mabira Forest, Chagwe, 3500–3800 ft.
2 ♂ syntypes in the MCSN, Genoa.

punctillata (*Oxymantis*) Werner, 1931 : 1333. Holotype ♂, [INDIA:] Madras, Palghat, Sappal, (43), 1700 ft, 15.v.1930 (*J. C. M. Gardner*).

punctulatus (*Oligonyx*) Saussure & Zehntner, 1894 : 174. Holotype ♂, [MEXICO:] Guerrero, Dos Arroyos, 1000 ft, 'figure', ix.— (*H. H. Smith*).

pustulifera (*Hierodula* (*Rhombodera*)) Wood-Mason, 1878 : 583. 1 ♀ syntype, [no data] [AUSTRALIA:] 'one of the islands in the Torres Straits' (*Rev. McFarlane*) [published information].

pygmaea (*Calidomantis*) Giglio-Tos, 1917 : 52. 1 ♂ syntype, UGANDA: Entebbe, 1-4.vi.1912 (*C. C. Gowdey*).
1 ♂ syntype in the MNHU, Berlin.

quadrимaculata (*Acontista mexicana* var.) Saussure & Zehntner, 1894 : 136. Holotype ♂, [GUATEMALA:] Vera Paz, Lanquin, 'figure' (*Champion*).
See *championi* (*Acontista*) Kirby, replacement name for the above, which is a junior secondary homonym of *Acontista quadrимaculata* (Serville, [1838]).

queenslandica (*Truxomantis*) Sjöstedt, 1918 : 31. 1 ♂ syntype, [AUSTRALIA:] 'Queensl.', Alice River, ix.— [1910–1913] (*Mjöberg*).
4 ♂, 2 ♀ syntypes in the NR, Stockholm.

radians (*Iris*) Uvarov, 1931a : 234. Holotype ♂, [PAKISTAN:] Lyallpur, light collection, 1.ix.1929 [abdomen missing].

raggei (*Oxypilus* (*Oxypilus*)) Roy, 1969 : 1115. Holotype ♂, SOMALI REPUBLIC: 'Brit. Somaliland', Hargeisa Locust Camp, 14.xi.1949 (*K. M. Guichard*).

rapax (*Mionyx*) Saussure & Zehntner, 1894 : 167. Holotype ♀, COSTA RICA: Cache (*H. Rogers*).

rehni (*Oxyophthalmellus*) La Greca, 1952 : 15. Holotype ♂, SOMALI REPUBLIC: 'Brit. Somaliland', Haud, 8°15' N, 46°15' E, 2100 ft, night, after rainy season, 3.iv.1932 (R. H. R. Taylor Coll.).

rendalli (*Acanthomantis*) Kirby, 1899 : 352. Holotype ♂ [not ♀, as stated by Kirby], MALAWI: 'Nyassaland', Fort Johnston (*P. Rendall*).

rhodesiaca (*Bolbella*) Beier, 1930b : 438. Holotype ♂, RHODESIA: 'S. Rhodesia', Mt Chirinda, x-xi.1911 (*C. F. M. Swynnerton*).

rhodesica (*Pyrgomantis*) Giglio-Tos, 1917 : 106. Holotype ♂, ZAMBIA: 'N. Rhodesia', Mkushi, iii.1910 (Silverlock Coll.) [abdomen missing].

robusta (*Sphendale*) Kirby, 1904a : 86. Holotype ♀, NEPAL (Hardwicke Bequest).

robusta (*Tarachodes*) Beier, 1930b : 434. Holotype ♂, NIGERIA: 'N. P. Nigeria', Matyoro Lakes, 25 miles N. of Gombe, iii.1929 (*Dr Ll. Lloyd*).

rotundipennis (Eremiaphila) Kirby, 1904b : 210. 1 ♀ syntype, [no data] EGYPT [published information]; 1 ♀ syntype, [no data] 'Westw. Mant. pl. 1, f. 11'; 1 nymphal syntype, EGYPT. Additional syntype(s) in the MHN, Geneva.

rubrobrunneus (Theopropus elegans) Beier, 1932 : 153. Holotype ♂, MALAYSIA: 'Malay. Penin.', F. M. S., Pahang, Cameron Highlands, Tanah Rata, 4800 ft, 25.xi.1924 (*I. Kedit*).

rufipennis (Eremiaphila) Uvarov, 1929 : 92. Holotype ♀, [ISRAEL:] Sinai, Wadi Tarfa (*Bodenheimer & Theodor*).

rungsii (Tenodera) Uvarov, 1935a : 41. Holotype ♀, MOROCCO: 'Maroc', Rabat, 15.xi.1933 (Rungs Coll.).

rustica (Mantis) Fabricius, 1781 : 350. 1 ♂ syntype, [ARGENTINA:] Patagonia [elytra and wings very damaged]; 1 ♂ syntype, [no data] [ARGENTINA:] 'ad littora Patagonia' [published information] [head, pronotum and forelegs missing].

In the Banks Collection, BMNH.

sabulosa (Sinaiella) Uvarov, 1939a : 552. Holotype ♂, SAUDI ARABIA: 'Arabia', Shudhaib, viii.1936 (*H. St J. B. Philby*).

saevus (Mionyx) Saussure & Zehntner, 1894 : 167. 1 ♂ syntype, [PANAMA:] V. de Chiriqui, 2500-4000 ft (*Champion*); 1 ♂ syntype, [PANAMA:] Bugaba, 800-1500 ft (*Champion*) [abdomen missing].

saussurei (Alphamantis) Giglio-Tos, 1915c : 171. 1 ♂ syntype, LESOTHO: 'Basutoland', Maseru (*L. Wroughton*).

1 ♂ syntype in the MHN, Geneva.

semirufa (Acontistes) Westwood, 1889 : 45. Holotype ♂, [BRAZIL:] Ega.

septentrionalis (Stagmatoptera) Saussure & Zehntner, 1894 : 186. Holotype ♀, [PANAMA:] Bugaba, 800-1000 ft, 'figuré' (*Champion*).

serricornis (Parastagmatoptera) Kirby, 1904b : 298. 1 ♂ syntype, [BRAZIL:] Santarem, 'Westw. Mantd. pl. 6, f. 1'.

Additional syntypes in the MHN, Geneva and possibly in other depositories.

shelfordi (Deroplatys) Kirby, 1903 : 304. Holotype ♀, [MALAYSIA:] Sarawak, vi.1896.

signifer (Harpax) Walker, 1859. Holotype ?, SRI LANKA: 'Ceylon' [left elytron only present].

similis (Gonypetella) Giglio-Tos, 1915c : 145. 1 ♂ syntype, ZAMBIA: 'N. E. Rhodesia', Serenje Dist., about 4500 ft, 14.xii.1907 (Neave Coll.); 1 ♂ syntype, ZAMBIA: 'N. E. Rhodesia', Serenje Dist., about 4500 ft, 15.xii.1907 (Neave Coll.); 1 ♂ syntype, [RHODESIA:] Mashonaland, Salisbury, xii.1899 (*G. A. K. Marshall*).

simplex (Gonypeta) Beier, 1930b : 440. Holotype ♂, SINGAPORE (*H. N. Ridley*).

sinensis (Antissa) Giglio-Tos, 1915b : 99. 2 ♂ syntypes, CHINA: Shense Prov., Taipaishan, 10.x.1905.; 1 ♂ syntype, CHINA: Shense Prov., Taipaishan.; 1 ♀ syntype, CHINA: Shense Prov., Taipaishan 12.x.1905.

1 ♂ syntype missing.

singaporana (Amorphoscelis) Giglio-Tos, 1915b : 32. Holotype ♂, SINGAPORE: (*H. N. Ridley*).

siporana (Acromantis) Giglio-Tos, 1915a : 6. 1 ♂ syntype, [INDONESIA:] Sumatra, Nias (Fry Coll.) [abdomen missing].

1 ♀ syntype in the MCSN, Genoa.

- somalica** (*Dorymantis*) Beier, 1930a : 197. Holotype ♂, SOMALI REPUBLIC: 'British Somaliland', Buran, 3000 ft, 10°13' N, 48°47' E, 19.xii.1929 (*C. L. Collenette*).
- speciosa** (*Chrysomantis*) Giglio-Tos, 1915b : 103. Holotype ♂, GHANA: 'Gold Coast', Aburi, 1913 (*W. H. Patterson*).
- spinicollis** (*Sphaeromantis*) Beier, 1930a : 194. Holotype ♂, SOMALI REPUBLIC: 'British Somaliland', Buran, 3000 ft, 10°13' N, 48°47' E, 19.xii.1929 (*C. L. Collenette*).
- splendida** (*Iris*) Uvarov, 1922 : 355. Holotype ♀, AFGHANISTAN: 'Afghan.' (*Dr Aitchison*).
- steelae** (*Oreomantis*) Uvarov, 1935b : 208. 2 ♀, 1 nymphal syntypes, [CAMEROUN:] Mt Cameroon, 2nd plateau, 9300 ft, 11.i.1932 (*M. Steele*); 1 nymphal syntype, [CAMEROUN:] Mt Cameroon, 1st plateau, 10,000–13,000 ft, 12.i.1932 (*M. Steele*).
1 nymphal syntype missing.
- strachani** (*Pseudochaeta*) Kirby, 1904a : 88. Holotype ♂ [not ♀, as stated by Kirby], [NIGERIA:] Lagos (*Dr H. Strachan*).
- straminea** (*Cheddikulama*) Henry, 1932 : 14. Holotype ♀, SRI LANKA: 'Ceylon', Kallar, 3 miles from Cheddikulam, 'Reared in Colombo from a young larva. Killed vi.1931.', 12.viii.1930 (*K. L. A. Perera*).
- striata** (*Hierodula*) Giglio-Tos, 1917 : 64. Holotype ♀, [MALAYSIA:] Perak (*Doherty*).
- striata** (*Hoplocorypha*) Beier, 1930b : 445. Holotype ♂, SOUTH WEST AFRICA: Okahandja, 10–16.ii.1928 (*R. E. Turner*).
- strigipennis** (*Oxypilus*) Westwood, 1889 : 44. Holotype ♂, [SOUTH AFRICA:] 'Port Natal' [Durban], 'Westw. pl. 9, f. 7'.
- striolatus** (*Oligonyx*) Saussure & Zehntner, 1894 : 173. 1 ♂ syntype, GUATEMALA: S. Geronimo, 'figuré' (*Champion*) [abdomen missing]; 1 ♂ syntype, GUATEMALA: S. Geronimo, (*Champion*); 1 ♂ syntype, GUATEMALA: Duenas (*Champion*) [head missing].
- subcornuta** (*Calamothespis*) La Greca, 1952 : 45. Holotype ♂, SOMALI REPUBLIC: 'Brit. Somaliland', Haud, 8°26' N, 45°43' E, 2300 ft, day, end of rainy season, 17.v.1932 (*R. H. R. Taylor Coll.*) [head and fragments of hind legs detached and stuck on card].
- sudanensis** (*Oxyothespis*) Giglio-Tos, 1916 : 42. 1 ♂ syntype, [SUDAN:] Red Sea, Port 'Soudan' (*Mrs N. Waterfield*) [abdomen missing].
2 nymphal ♀ syntypes, one each in the MIZSU, Turin and the ISSS, Florence.
- superstitiosa** (*Mantis*) Fabricius, 1781 : 348. Holotype ♀, 'AFRICA': 'Africa aequinoctiali' [published information] [abdomen missing].
In the Banks Collection, BMNH.
- tanzanicus** (*Oxypilus* (*Oxypilus*)) Roy, 1969 : 1110. Holotype ♂, TANZANIA: 'Tanganyika', Rukwa Rift, Kafukola, 25.xi.1954 (*R. F. Chapman*).
- taylori** (*Calamothespis*) La Greca, 1952 : 40. Holotype ♂, SOMALI REPUBLIC: 'Brit. Somaliland', Haud, 4000 ft, rainy season, ix.1932 (*Capt. R. H. Taylor*).
- tessellatus** (*Oligonyx*) Saussure & Zehntner, 1894 : 174. Holotype ♂, [MEXICO:] Guerrero, Omilteme, 8000 ft, 'figuré', vii.— (*H. H. Smith*).
- testacea** (*Cimantis*) Werner, 1931 : 1330. Holotype ♂, [INDIA:] Bengal, Tista Valley, Darjeeling, 700 ft, (27), 27.ix.1929 (*J. C. M. Gardner*).
- toltecus** (*Oligonyx*) Saussure & Zehntner, 1894 : 175. Holotype ♀, [MEXICO:] Guerrero, Chilpancingo, 4600 ft, viii.— (*H. H. Smith*).

- trilobus** (*Galepsus*) Giglio-Tos, 1917 : 102. 2 ♂ syntypes, [TANZANIA:] 'G. E. Africa', Vy. Ruaha R., 18-21.xii.1910 (S. A. Neave).
1 ♂ syntype in the MNHU, Berlin.
- trinitatis** (*Bantiella*) Giglio-Tos, 1915c : 186. 1 ♂, 2 ♀ syntypes, TRINIDAD: Port of Spain (H. Caracciola).
- tristis** (*Uvaromantis*) Beier, 1930b : 457. Holotype ♂, GHANA: 'Gold Coast', Makango, 18.vi.1928 (A. W. J. Pomeroy) [head missing].
- turcica** (*Eremiaphila*) Westwood, 1889 : 29. 4 ♀ syntypes, TURKEY.
- turneri** (*Hoplocorypha*) Beier, 1930b : 445. Holotype ♂, SOUTH WEST AFRICA: Okahandja, 10-16.ii.1928 (R. E. Turner).
- ugandana** (*Hoplocorypha*) Beier, 1930b : 444. Holotype ♂, UGANDA: Chua, xi-xii.1925 (Dr G. D. H. Carpenter).
- ugandanus** (*Amorphoscelis*) Beier, 1931 : 359. Holotype ♀, UGANDA: Kampala, on Eucalyptus, 27.ix.1928 (G. L. R. Hancock) [head missing].
- ugandanus** (*Pseudoharpax*) Giglio-Tos, 1915b : 106. 1 ♂ syntype, [RHODESIA:] Mashonaland, Salisbury, xi.1899 (G. A. K. Marshall); 1 ♀ syntype, UGANDA: Entebbe, 28.x.1912 (C. C. Gowdey); 1 ♀ syntype, UGANDA: Mabira Forest, 3.viii.1913 (C. C. Gowdey).
The ♂ from Rhodesia is labelled by Giglio-Tos as 'typus', although the only locality given in the description is Uganda.
Additional syntypes, ♂ and ♀, in the MCSN, Genoa.
- umtalica** (*Ligariella*) Giglio-Tos, 1915c : 172. Holotype ♂, [RHODESIA:] Mashonaland, Umtali, 1900 (Marshall Coll.).
- urbana** (*Mantis*) Fabricius, 1775 : 278. See page 311.
- uvana** (*Dysaules*) Henry, 1932 : 2. Holotype ♂, SRI LANKA: 'Ceylon', Uva, Wellawaya, 'Reared to maturity in Colombo, 6.viii.1931', iv.1931 (K. L. A. Perera).
- uvarovi** (*Empusa*) Chopard, 1921 : 52. 1 ♂ syntype, [IRAQ:] Mesopotamia, on alhagi at margin of dried-up marsh 12 miles below Amara nr Tigris, 12.ix.1918 (W. Edgar Evans); 1 ♀ syntype, [IRAQ:] Mesopotamia, Amara, 10.ix.1918 (P. A. Buxton).
- uvarovi** (*Eremiaphila*) Bodenheimer, 1933 : 79. Holotype ♀, JORDAN: 'Transjordan', Maan, 1.xi.1932.
- uvarovi** (*Gonypetella*) Beier, 1930b : 442. Holotype ♂, [KENYA:] 'Brit. E. Africa', Mogorri R. Valley, vi.1913 (A. O. Luckman).
- vansomereni** (*Junodia*) Roy, 1972a : 573. Holotype ♂, UGANDA: Bwamba (H), iii.1948 (V. G. L. van Someren).
- venusta** (*Stagmomantis*) Saussure & Zehntner, 1894 : 145. 1 ♂ syntype, [GUATEMALA:] Vera Paz, Telemán, 'figuré' (*Champion*) [tip of abdomen missing]; 1 ♀ syntype, [GUATEMALA:] Vera Paz, Sinanja, 'figuré' (*Champion*); 1 ♀ syntype, GUATEMALA: Panima (*Champion*) [abdomen missing].
- versicolor** (*Hierodula*) Henry, 1932 : 10. Holotype ♂, SRI LANKA: 'Ceylon', 'Reared in Colombo ex eggs laid by a ♀ captured at Sigiriya, Ceylon, 30.xi.1931', 'First laboratory bred generation', 'Killed 23.iii.1932' (P. D. Ambrose).
- victorina** (*Pseudomantis*) Westwood, 1889 : 36. Holotype ♀, AUSTRALIA: 'North Austr.', Victoria River Depot, 'Westw. Mantd. pl. 9, f. 6.', iii.1856.

viridis (*Coptopteryx*) Giglio-Tos, 1915b : 66. 1 ♂ syntype, [ARGENTINA:] Buenos Aires.
Additional syntypes in the MNHU, Berlin.

vitrea (*Acontista*) Saussure & Zehntner, 1894 : 138. 1 ♂ syntype, [PANAMA:] V. de Chiriqui, 2–3000 ft, 'figuré' (*Champion*).

There are also 2 ♂ with identification labels by Saussure and similar data to the above except for collection heights of '3–4000 ft' and 'below 4000 ft.' Only '2–3000 ft' is mentioned in the description and these specimens have therefore not been regarded as syntypes.

Additional syntype(s) in the MHN, Geneva and perhaps in other depositories.

westwoodi (*Acontista*) Saussure & Zehntner, 1894 : 134. 1 ♂ syntype, [BRAZIL:] Tapajos; 1 ♀ syntype, [BRAZIL:] Para.

Additional ♀ syntype(s) in the MHN, Geneva.

westwoodi (*Hierodula*) Kirby, 1904b : 247. 1 ♂ syntype, NEPAL: 'Westw. Mant. pl. 4, fig. 2.' (Hardwicke Bequest); 1 ♂, 2 ♀ syntypes, NEPAL: (Hardwicke Bequest).

westwoodi (*Phyllocrania*) Wood-Mason, 1876 : 176. See page 311.

westwoodi (*Theopompa*) Kirby, 1904a : 83. LECTOTYPE ♂ [not ♀, as stated by Kirby], GHANA: 'Gold Coast', Tamsoo; here designated.

Paralectotypes. 1 ♂ [not ♀, as stated by Kirby], data as lectotype [abdomen missing]; 1 ♂ [not ♀, as stated by Kirby], [GHANA:] Ashanti; 2 ♂, data as lectotype [different species, see below].

The 2 ♂ paralectotypes thought by Kirby to represent the ♂ of his supposed *westwoodi* ♀, are now identified as *Theopompella chopardi* Roy, 1961.

woodmasoni (*Hierodula*) Werner, 1931 : 1331. Holotype ♀, [INDIA:] Madras, Nilambur, Arevacode, (42), 6.iii.1925 (S. K. Pillar) [published as 'Pillai'].

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THE PROTURA
OF THE BISMARCK ARCHIPELAGO
AND SOLOMON ISLANDS

S. L. TUXEN

AND

G. IMADATÉ

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
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THE PROTURA OF THE BISMARCK ARCHIPELAGO AND SOLOMON ISLANDS



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By S. L. TUXEN & G. IMADATÉ

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SYNOPSIS

An account is given, with keys, of the Protura of the Bismarck Archipelago and Solomon Islands, making use of recently acquired material in the Zoological Museum, Copenhagen, and the British Museum (Natural History). Twelve species, eleven of them new, are added to the single species previously known from this region.

INTRODUCTION

AT THE time of the senior author's revision of the world species of Protura (Tuxen, 1964) only one Melanesian species was known, *Silvestridia solomonis* (Imadaté) from Guadalcanal. Since then, much more material has become available from the following sources.

1. Noona Dan Expedition of the Zoological Museum, Copenhagen (1962), soil fauna samples from various localities in the Bismarck Archipelago and Solomon Islands (Petersen, 1966; Wolff, 1968). Specimens placed in Zoological Museum, Copenhagen.
2. Royal Society Expedition to the Solomon Islands (1965), soil samples placed in British Museum (Natural History), collections made by Mr P. N. Lawrence and Dr P. J. M. and Mrs P. Greenslade.
3. Collections of soil arthropods made by Dr and Mrs Greenslade in the Solomon Islands during the years 1964-1966, specimens placed in British Museum (Natural History).

We are grateful to Dr and Mrs Greenslade and to Dr Theresa Clay for making the last two groups of soil samples available to us.

In total, these samples contained 450 specimens of Protura from more than 35 different localities and proved to comprise 13 species belonging to three families. It is now possible for a synoptic study to be made of the species from these islands following the lines of Tuxen (1964), where details of the genera will be found, including diagnoses and keys for their separation. All figures are drawn from the holotypes.

We have followed the schemes proposed by Tuxen (1949) and Imadaté (1965 : 198), and for each species set out the chaetotaxy as follows: if all stages are known, setae are marked primary ('prim.'), secondary ('sec.'), tertiary ('tert.') and complementary ('compl.') for larva I, II, matus junior and adult respectively. If larva I is not known, the chaetotaxy of the first known stage is marked 'composition of setae'. In the first column for every stage is given the formula according to Tuxen's system.

It should be noted that what Tuxen called no. 3 in the anterior row on the abdominal terga is here called '*P* 3', namely no. 3 in the posterior row. Tuxen (1964 : 62) noted that "3" of the anterior row is often situated behind the other setae of this row and may in terg. VII lie so far back that it can be reckoned as belonging to the posterior row'. As shown by Imadaté (1965 : 197) from a study of postembryonal development of the chaetotaxy, actually the reverse is the case: it is *P* 3 from the posterior row which is placed anteriorly in some of the abdominal tergites. This should be taken into consideration when comparing our 'formulae' with the earlier ones by Tuxen and others.

The following abbreviations are used for depositories of material cited in this paper.

BMNH	British Museum (Natural History), London
KU	Kyoto University, Kyoto, Japan.
UZM	Universitetets Zoologiske Museum, Copenhagen, Denmark.

LIST OF LOCALITIES

On the map (Text-fig. 76) the collecting sites are numbered as follows (the island in *italics*).

BISMARCK ARCHIPELAGO (*Noona Dan Expedition*).

1. Boliu, *Mussau*, 4.vi.1962. Soil with rotten leaves.
2. Malakata, *Mussau*, 11.vi.1962. Soil and half-rotten leaves, primary forest.
3. Banatam, *Lavongai*, 20-26.iii.1962. Half-rotten leaves and soil. Mangrove swamp (20.iii) and primary forest (26.iii).
- 4-5. Sumuna and Kollepine, *Dyaul*, 7-12.iii.1962. Half-rotten leaves and soil, primary forest.
6. Lemkamin, *New Ireland*, 23.iv.1962. Grass tufts and soil, 900 m.
7. Manuan, *Duke of York*, 21.vii.1962. Soil, secondary forest.
8. Valoka, *New Britain*, 13.vii.1962. Soil and litter, primary forest.

SOLOMON ISLANDS (*P. J. M. & P. Greenslade* and *P. N. Lawrence* collections as well as two sites from *Noona Dan Expedition* (No. 28 & 34)).

9. Falomai village, *Mono*, Treasury group, 20.ix.1965. Soil.
10. Kuturasele, *Choiseul*, 23.xii.1965. Soil.
11. *Wagina*, *Choiseul* group, 25.v.1965.
12. Gizo, *Nusatupe*, New Georgia group, 4.vi.1965. Litter.
13. Kuzi, *Kolombangara*, New Georgia group, 6.xi.1965.
14. Buala, *Santa Isabel*, 14.xii.1964. Litter.
15. Tatamba, *Santa Isabel*, 27.ix.1965.
16. Yandina, *Russell*, 15.viii.1966.
- 16a. *Russell*, 18.iii.1965. Forest soil.
17. Vatilau, *Nggela*, Florida group. 14.vi.1965.
18. Soso, *Nggela*, 2.xii.1965. Forest litter.
19. Koela, *Savo*, Guadalcanal group. 1.vi.1965. Litter.
20. One Naika, *Savo*, 1.vi.1965. Litter.
21. Mt Austen, *Guadalcanal*, 330 m, 24.x.1964-10.viii.1966. Forest litter.
22. Mt Jonapau, *Guadalcanal*, 1100 m, 6.v.1965. Forest litter.
23. Mt Popamanaseu, *Guadalcanal*, 26.vi.1965. Forest litter.
24. Nr Malukuna, *Guadalcanal*, 9.vi.1966.
25. Betimatu, *Guadalcanal*, 31.xii.1964. Forest litter, bush.
26. Berande Point, *Guadalcanal*, 30.iv.1965. Forest litter, sea level.
27. Kukum, *Guadalcanal*, 15.xii.1964-14.vii.1966.
28. Honiara, *Guadalcanal* (*Noona Dan Expedition*), 4.viii.1962.
29. Lunga, *Guadalcanal*, viii.1966.
30. Dala, *Malaita*, 16.ii.1965. Forest litter.
31. Warahitor, *San Christoval*, 1.viii.1965.
32. *Bellona*, Rennell group, 28.v.1965. Garden litter.
33. Kagaba Bay, *Rennell*, 6.iv.1965. Litter and soil from Coconut-grove.
- 33a. Kagaba Bay, *Rennell*, 6.iv.1965. Rotten tree trunk, primary forest.
34. Niupani, *Rennell* (*Noona Dan Expedition*), 18-19.viii.1962.
35. Graciosa Bay, *Ndeni*, Santa Cruz Group, 6.iv.1965.

KEY TO THE KNOWN MELANESIAN PROTURA

- | | | |
|---|---|---|
| 1 | Spiracles absent; only one or two pairs of the abdominal legs two-segmented (<i>Acerentomoidea</i>) | 2 |
| - | Spiracles present; all three pairs of abdominal legs two-segmented (<i>Eosentomoidea</i> ;
only genus <i>Eosentomon</i>) | 6 |
| 2 | The two first pairs of abdominal legs two-segmented <i>Condeellum crucis</i> (p. 346) | |
| - | Only the first pair two-segmented | 3 |
| 3 | Second and third pair of abdominal legs with only one seta
<i>Silvestridia solomonis</i> (p. 336) | |
| - | These abdominal legs with two setae, a long subapical seta and a very short apical
one | 4 |
| 4 | Striate band of abdominal segment VIII well developed
<i>Gracilentulus greensladei</i> (p. 340) | |
| - | Striate band reduced (<i>Berberentulus</i>) | 5 |

- 5 Body length ab.800 μm ; sensilla *e* of foretarsus much shorter than *c*; *A* 1 missing in tergite V ***B. buchi*** (p. 340)
- Body length ab.900 μm ; sensilla *e* as long as *c*; *A* 1 present in tergite V ***B. rennellsensis*** (p. 338)
- 6 Caput processus of female squama genitalis semicircularly rounded; *P* 2 on abdominal terg. II–VI displaced anteriorly. Foretarsal sensilla *t*–1 situated close to α 3, *b*'–1 absent, *P* 2 and 1" on terg. VIII not displaced anteriorly, foretarsus 63 μm ***E. noonadanae*** (p. 367)
- Caput processus bent against median edge of stylus in a sharp angle; *P* 2 on terg. II–VI situated in a row with *P* 1 and/or *P* 3 7
- 7 Foretarsal sensilla *t*–1 placed at about midway between α 3 and α 3', *b*'–1 present; *P* 2 and 1" on abdominal terg. VIII not displaced anteriorly, stern. VIII with 0–7 setae 8
- Foretarsal sensilla *t*–1 placed close to α 3', *b*'–1 absent; *P* 2 and 1" on terg. VIII displaced anteriorly, stern. VIII with 2–7 setae 12
- 8 Accessory setae *P* 1a on abdominal terg. VI short, less than one-fifth of *P* 1 and situated in row with *P* 1 and 2. Abdominal terg. IV with *A* 4 and 5, terg. V–VI without *A* 1, 2 and 3 or *A* 1, 2, 3 and 4, terg. VII without *A* 1, 2, 3 and 4, terg. X–XI with 8 setae, foretarsus 94–104 μm ***E. oceaniae*** (p. 350)
- Accessory setae *P* 1a on terg. VI long, more than *P* 1 and situated in a row with the other accessory setae 9
- 9 Abdominal terg. X–XI with 8 setae, *P* 1a on terg. VII placed in a row with the other accessory setae. Terg. IV without *A* 3, terg. V–VI without *A* 1, 2 and 3, terg. VII without *A* 1, 2, 3 and 4, foretarsus 97–98 μm ***E. solomonense*** (p. 361)
- Abdominal terg. X–XI with less than 8 setae, *P* 1a on terg. VII placed in row with *P* 1 and 2 10
- 10 Terg. X with 4 setae (1 and 4). Terg. IV with 10 anterior setae (*A* 1, 2, 3, 4 and 5), terg. V–VI without *A* 1, 2 and 3, terg. VII without *A* 1, 2, 3 and 4, foretarsus 85–95 μm ***E. sakura*** (p. 359)
- Terg. X with only 2 setae (4) 11
- 11 Terg. IV with 10 anterior setae. Terg. V–VI without *A* 1, 2 and 3, terg. VII without *A* 1, 2, 3, 4 and 5; female squama genitalis with latero-proximal sclerotization, foretarsus 70–76 μm ***E. solare*** (p. 356)
- Terg. IV without *A* 1, 2 and 3 or *A* 1, 2, 3 and 4. Terg. V–VI without *A* 1, 2, 3 and 4 or *A* 1, 2 and 3, terg. VII without *A* 1, 2, 3 and 4; female squama genitalis without latero-proximal sclerotization, foretarsus 73–77 μm ***E. melanesiense*** (p. 352)
- 12 Empodium of hind tarsus short and less than one-fifth claw length; foretarsal sensilla *a*' placed nearer to α 3' than to α 3. Terg. II–VI without *A* 3, terg. VII without *A* 1 and 3, foretarsus 95 μm ***E. guadalcanalense*** (p. 363)
- Empodium of hind tarsus long and more than one-third claw length; foretarsal sensilla *a*' placed nearer to α 3 than to α 3'. Terg. II–VI with 10 anterior setae, terg. VII without *A* 1 and 3, foretarsus 57–62 μm ***E. notiale*** (p. 365)

ACERENTOMIDAE

One-hundred and twenty-three specimens from 14 localities are found in the present collection. They consist of four species, viz. *Silvestridia solomonis* (Imadaté), *Berberentulus rennellsensis* sp. n., *B. buchi* sp. n. and *Gracilentulus greensladei* sp. n.

Silvestridia solomonis (Imadaté)

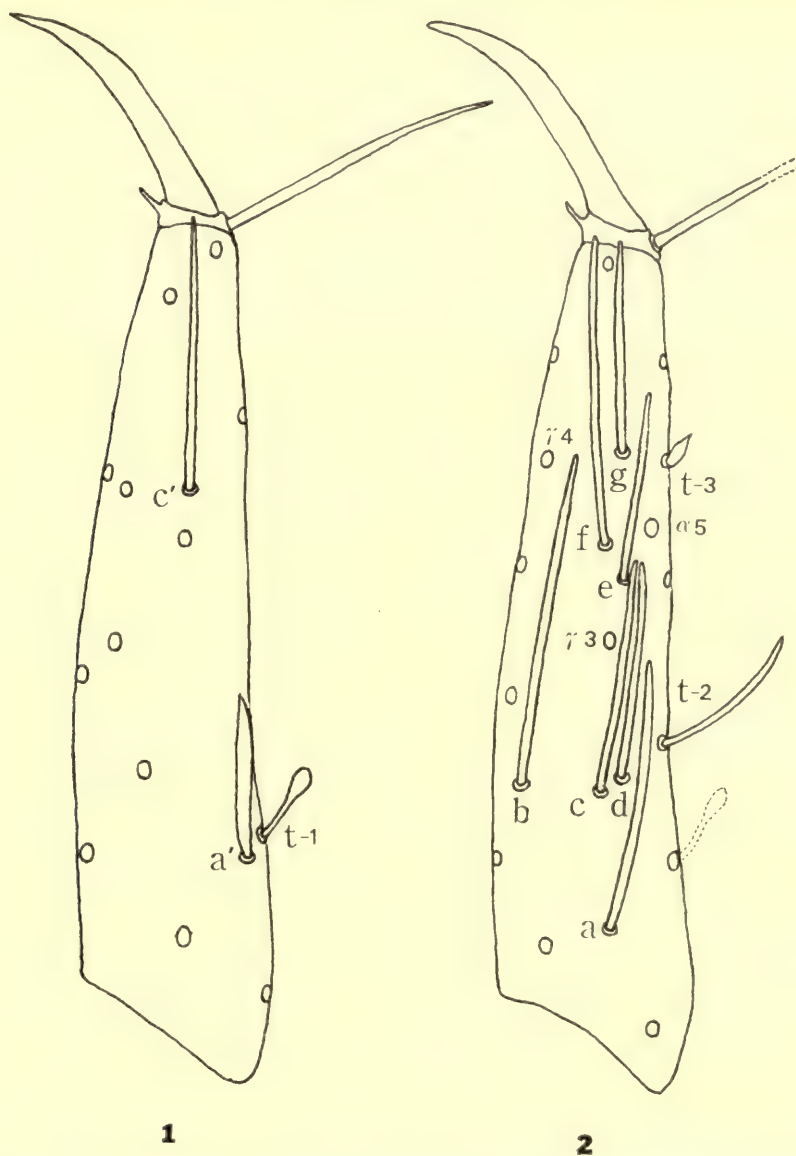
Acerentulus solomonis Imadaté, 1960 : 5–8. Holotype ♀, SOLOMON Is.: Guadalcanal, River Tantu, 20.ix.1958 (*T. Tokioka*) (lost).

Silvestridia solomonis (Imadaté) Tuxen, 1964 : 328-329.

Silvestridia solomonis (Imadaté); Tuxen & Imadaté, 1974 : 85-88 (redescription).

SPECIMENS EXAMINED.

SOLOMON ISLANDS: Savo, Koela, 1.vi.1965 (*P. J. M. & P. Greenslade*), 1 ♂, 4 ♀ (BMNH); Guadalcanal, Mt Austen, 11.ii.1965, 1 ♀; 21.iv.1965, 1 ♀; 24.v.1965,



FIGS 1, 2. *Berberentulus rennellensis*. Foretarsus, (1) interior and (2) exterior views.

1 ♀; 8.ii.1966, 1 ♀ (all *P. J. M. & P. Greenslade*) (all BMNH); G., nr Malukuna, 9.vi.1966 (*P. J. M. & P. Greenslade*), 1 ♀ (BMNH); Ndeni, Graciosa Bay, 6.iv.1965 (*P. J. M. & P. Greenslade*), 1 ♀ (BMNH).

Differs from other species of the genus *Silvestridia* by the absence of foretarsal sensilla *b'*.

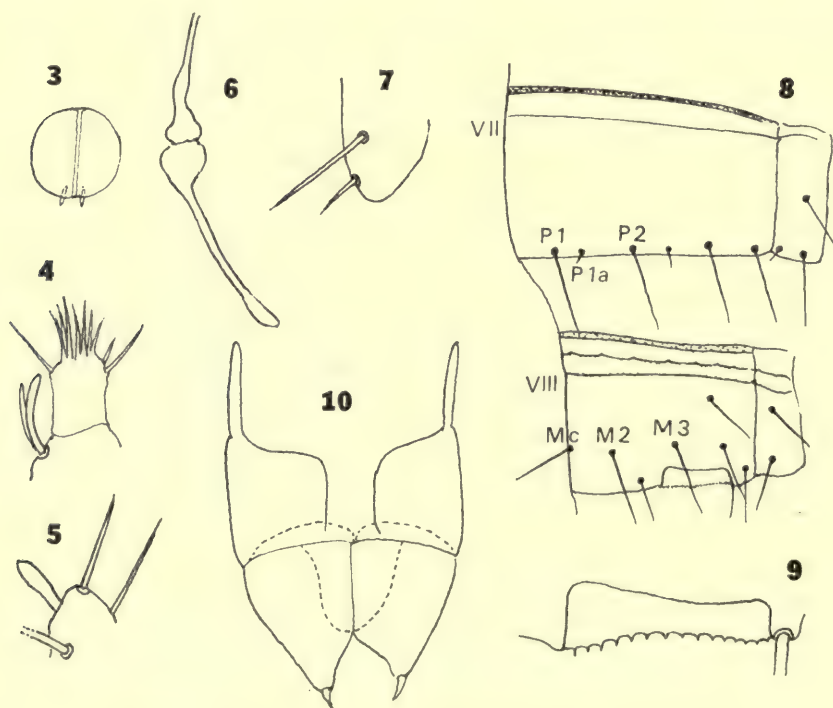
***Berberentulus rennellensis* sp. n.**

(Text-figs 1-10)

Body length 900 μ m in expanded adults.

Mouthparts small, sensillae on maxillary palpus slightly broadened, that on labial palpus distinctly broadened; pseudoculus almost circular, $PR = 13-14$; canal of the maxillary gland of the normal shape, its proximal part rather short.

Foretarsus 68 μ m in length; claw with no inner flap; $TR = 3.3$; empodium short, $EU = 0.12-0.14$; position and shape of foretarsal sensillae similar to that of *B. yodai* Imadaté. Dorsal sensilla *t-1* claviform, $BS = 0.41$; *t-2* thin and *t-3* small. Exterior sensilla *a* relatively long, apex almost reaching base of γ 3; *b* slightly broadened and extremely long, its apex slightly surpassing the base of γ 4; *c* situated close to *d* and subequal to *d* in length; apices of *c* and *d* not surpassing base of α 5; *e* as long as *c* and by far surpassing base of *g* and *t-3*; *f* thin and long and close to *e*; *g* slightly surpassing the tarsus. Interior sensilla *a'* broad and located in



FIGS 3-10. *Berberentulus rennellensis*. 3, pseudoculus; 4, maxillary palpus; 5, labial palpus; 6, canal of maxillary gland; 7, abdominal appendage II; 8, dorsal chaetotaxy of abd. VII-VIII; 9, comb on terg. VIII; 10, female squama genitalis.

TABLE I
 Chaetotaxy of *Berberentulus rennellensis*

	Larva II		Adult	
(Dorsal)	Formula	Comp. of setae	Formula	Tert. and compl. setae
Th.I	4	1,2	4	
II-III	6	A 2,4, M	6	
	$\frac{12}{12}$	P 1,2,2a,3,4,5	$\frac{14}{14}$	P 1a
Abd.I	0		6	A 1,2,5
	$\frac{10}{10}$	P 1,2,2a,3,5	$\frac{12}{12}$	P 1a
II-III	0		6	A 1,2,5
	$\frac{12}{12}$	P 1,2,2a,3,4,5	$\frac{16}{16}$	P 1a,4a
IV	0		6	A 1,2,5
	$\frac{14}{14}$	P 1,2,2a,3,4,4a,5	$\frac{16}{16}$	P 1a
V	0		6	A 1,2,5
	$\frac{14}{14}$	P 1,2,2a,3,4,4a,5	$\frac{16}{16}$	P 1a
VI	0		4	A 2,5
	$\frac{14}{14}$	P 1,2,2a,3,4,4a,5	$\frac{16}{16}$	P 1a
VII	0		2	A 5
	$\frac{14}{14}$	P 1,2,2a,3,4,4a,5	$\frac{16}{16}$	P 1a
VIII	2-6	A 3, M 2,3,4	$\frac{4-7}{8}$	A 5, M ₂ c
	$\frac{8}{8}$	P 1,2,3,4	$\frac{8}{8}$	
IX	8	1,3,4,5	14	2,3a,4a
X			12	1,2,3,3a,4,5
XI			6	
Telson	9		9	
(Ventral)				
Th.I	$\frac{2-2}{4}$	A 1, M 1	$\frac{4-2}{6}$	A 2
		P 1,2		P 3
II-III	$\frac{5-2}{2}$	A c,2,3, M	$\frac{5(7)-2}{4}$	(A 4)
		P 1		P 2
Abd.I	$\frac{3}{2}$	A c,2	$\frac{3}{4}$	
		P 1		P 2
II-III	$\frac{1}{5}$	A c	$\frac{3}{5}$	A 2
		P c,2,3		
IV-VII	$\frac{1}{6}$	A c	$\frac{3}{8}$	A 2
		P 1,2,3		P 1a
VIII	$\frac{4}{0}$		$\frac{4}{0}$	
IX	4		4	
X			4	
XI			4(6)	
Telson	8		6	

row with $t-1$; b' absent; c' thin and a little distal to α 5, apex slightly surpassing the tarsus. Chaetotaxy (Table 1) similar to that of *B. nitidus* Imadaté & Yosii, but P 2 on abdominal stern. I present and A 1 on terg. VI absent, but present on terg. I–V. Abdominal appendages II–III with two setae each, the apical one less than half the subapical. The striate band on abd. VIII reduced, no distinct striae; comb on terg. VIII oblique, consisting of 12–13 minute teeth; female squama genitalis with pointed acrostylus.

Larva II. Foretarsus 50 μ m. Chaetotaxy typical for the genus.

Holotype ♂, SOLOMON ISLANDS: Rennell Island, Kagaba Bay, 6.iv.1965 (*P. J. M. & P. Greenslade*) (BMNH).

Paratypes. Same data as holotype, 1 ♂, 1 ♀ (BMNH).

This species closely resembles *B. yodai* Imadaté from southern Thailand in such characters as the position and shape of most of the foretarsal sensillae, in the absence of b' as well as in the tergal chaetotaxy of the abdomen, but it may be distinguished by the presence of A 1 on abdominal terg. IV–V.

Berberentulus buchi sp. n.

Body length 770–800 μ m in expanded adults.

Mouthparts as in preceding species; pseudoculus almost circular, $PR = 11-13$; canal of maxillary gland of normal shape, its proximal part rather short.

Foretarsus 51–56 μ m in length; claw with no inner flap, $TR = 3.1-3.2$; empodium short, $EU = 0.16-0.18$; position and shape of foretarsal sensillae similar to that of the preceding species, except that sensilla e is short, much shorter than c and just reaching base of $t-3$.

The chaetotaxy (Table 2) similar to that of the preceding species, but A 1 is always missing on terg. V, and sometimes also on terg. III–IV or even II (2 ♂ and 1 ♀ from Valoka). Abdominal appendages II–III, the striate band and comb on abdomen VIII and female squama genitalis as in the preceding species.

Muturus junior. Foretarsus 43–48 μ m. Important characters such as foretarsal sensillae, canal of maxillary gland, etc. as in adult.

Larva II. Foretarsus 37–44 μ m. Chaetotaxy typical.

Holotype ♀, BISMARCK ARCHIPELAGO: New Britain, Valoka, 13.vii.1962 (*Noona Dan Expedition*) (UZM).

Paratypes. BISMARCK ARCHIPELAGO: Mussau, Boliu, 4.vi.1962 (*Noona Dan Expedition*), 2 ♀, 1 I II (UZM); New Britain, Valoka, 13.vii.1962 (*Noona Dan Expedition*) 8 ♂, 8 ♀, 2 m.j., 2 I II (UZM).

The present species is named in honour of Mr Will. Buch who made the soil collections (as well as many others) on the Noona Dan Expedition. It is closely similar to the preceding species and *B. yodai* Imadaté from southern Thailand but, because of the difference in length of sensilla e , the body size and the different chaetotaxy of terg. IV–V, we prefer to regard it as a distinct species.

Gracilentulus greensladei sp. n.

(Text-figs 11–21)

Body length 700–810 μ m in expanded adults.

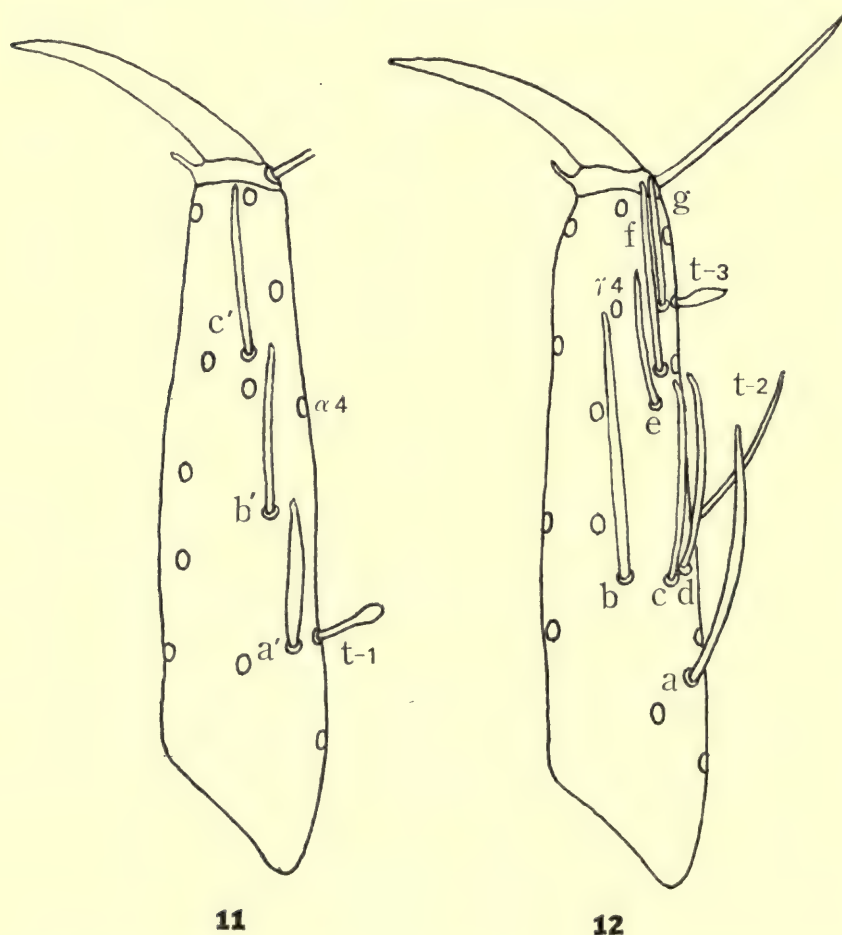
Mouthparts of normal type, sensillae on maxillary palpus slightly broadened, that on labial palpus also broadened; pseudoculus almost circular, $PR = 11-13$; canal of maxillary gland of normal shape, its proximal part rather short.

TABLE 2
 Chaetotaxy of *Berberentulus buchi*

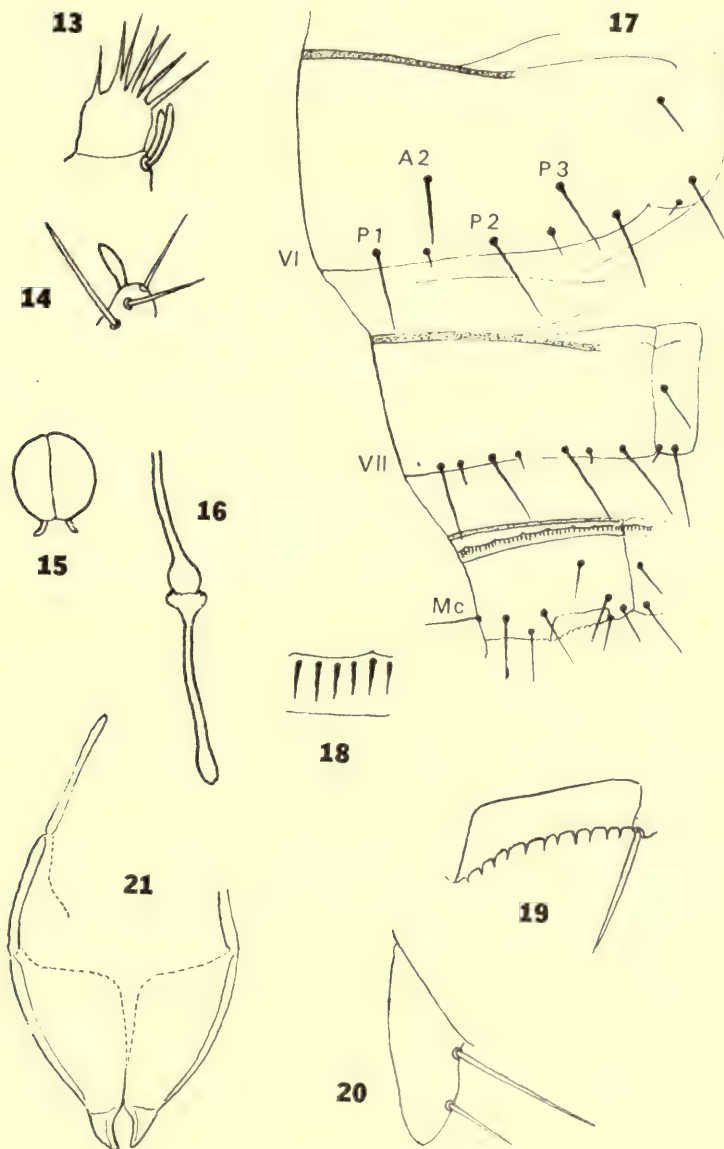
	Larva II		Mat. jun.		Adult	
	Form.	Comp. of setae	Form.	Tert. setae	Form.	Compl. setae
(Dorsal)						
Th.I	4	1,2	4		4	
II-III	$\frac{6}{12}$	$A\ 2,4, M$ $P\ 1,2,2a,3,4,5$	$\frac{6}{14}$	$P\ 1a$	$\frac{6}{14}$	
Abd.I	$\frac{0}{10}$	$P\ 1,2,2a,3,5$	$\frac{6}{10}$	$A\ 1,2,5$	$\frac{6}{12}$	$P\ 1a$
II-III	$\frac{0}{12}$	$P\ 1,2,2a,3,4,5$	$\frac{6}{14}$	$A\ 1,2,5$ $P\ 4a$	$\frac{6}{16}$	$P\ 1a$
IV	$\frac{0}{14}$	$P\ 1,2,2a,3,4,4a,5$	$\frac{6}{14}$	$A\ 1,2,5$	$\frac{6}{16}$	$P\ 1a$
V	$\frac{0}{14}$	$P\ 1,2,2a,3,4,4a,5$	$\frac{4}{14}$	$A\ 2,5$	$\frac{4}{16}$	$P\ 1a$
VI	$\frac{0}{14}$	$P\ 1,2,2a,3,4,4a,5$	$\frac{4}{14}$	$A\ 2,5$	$\frac{4}{16}$	$P\ 1a$
VII	$\frac{0}{14}$	$P\ 1,2,2a,3,4,4a,5$	$\frac{2}{14}$	$A\ 5$	$\frac{2}{16}$	$P\ 1a$
VIII	$\frac{2-6}{8}$	$A\ 3, M\ 2,3,4$ $P\ 1,2,3,4$	$\frac{4-7}{8}$	$A\ 5, M\ c$	$\frac{4-7}{8}$	
IX	8	1,3,4,5	12	2,4a	14	3a
X			8	1,3,4,5	12	2,3a
XI			6		6	
Telson	9		9		9	
(Ventral)						
Th.I	$\frac{2-2}{4}$	$A\ 1, M\ 1$ $P\ 1, 2$	$\frac{4-2}{6}$	$A\ 2$ $P\ 3$	$\frac{4-2}{6}$	
II-III	$\frac{5-2}{2}$	$A\ c,2,3, M$ $P\ 1$	$\frac{5-2}{4}$	$P\ 2$	$\frac{5(7)-2}{4}$	(A 4)
Abd.I	$\frac{3}{2}$	$A\ c, 2$ $P\ 1$	$\frac{3}{4}$	$P\ 2$	$\frac{3}{4}$	
II-III	$\frac{1}{5}$	$A\ c$ $P\ c,2,3$	$\frac{3}{5}$	$A\ 2$	$\frac{3}{5}$	
IV-VII	$\frac{1}{6}$	$A\ c$ $P\ 1,2,3$	$\frac{3}{8}$	$A\ 2$ $P\ 1a$	$\frac{3}{8}$	
VIII	$\frac{4}{0}$		$\frac{4}{0}$		$\frac{4}{0}$	
IX	4		4		4	
X			4		4	
XI			0(2)		4(6)	
Telson	8		6		6	

Foretarsus 51–56 μm in length. Among 76 adult specimens from seven different localities no local variation was found in the foretarsal length. Claw with no inner flap, $TR = 2.8\text{--}3.1$; empodium short, $EU = 0.11\text{--}0.16$; dorsal sensilla $t-1$ claviform, $BS = 0.42\text{--}0.44$; $t-2$ thin and $t-3$ small; exterior sensilla a slightly broadened and long, apex almost reaching the base of $\alpha 4$; b also a little broadened and long, its apex reaching the base of $\gamma 4$; c situated close to d and subequal to d in length; c and d shorter than b ; e and f close together; apices of f and g slightly surpass the tarsus. Interior sensilla a' slightly distal to $t-1$ and broadened, b' thin and situated in a row with $t-2$; c' thin.

Abdominal chaetotaxy (Table 3) peculiar by the reduction of tergal anterior setae: $A 1$ on abdominal terg. II–VI absent as in *Silvestridia*; on terg. VII only a single pair of anterior setae, $A 5$, present; terg. VIII with two pairs of anterior setae, $A 3$ and 5. Abdominal appendages II–III have two setae each, the apical one being less than half the subapical. Striate



FIGS 11, 12. *Gracilentulus greensladei*. Foretarsus, (11) interior and (12) exterior views.



FIGS 13–21. *Gracilentulus greensladei*. 13, maxillary palpus; 14, labial palpus; 15, pseudoculus; 16, canal of maxillary gland; 17, dorsal chaetotaxy of abd. VI–VIII; 18, striae on the band of abd. VIII; 19, comb on terg. VIII; 20, abdominal appendage II; 21, female squama genitalis.

band on abdomen VIII reduced to some degree; striae distinct in the anterior part of the band, but not visible in the posterior part; comb on terg. VIII consisting of about 10 small teeth; female squama genitalis with long and pointed acrostylus.

Maturus junior. Foretarsus 47-48 μm . Important characters such as foretarsal sensillae, comb on abdominal terg. VIII, etc. as in adult.

Larva II. Foretarsus 42-43 μm . Foretarsal sensilla *b'* not found in the three specimens examined; striae in band on abdomen VIII fainter than those of the adult.

Larva I. Foretarsus 37 μm . Position and shape of foretarsal sensillae, the striate band on abdomen VIII, etc. as in the larva II.

Holotype ♂, SOLOMON ISLANDS: Guadalcanal, Kukum, 15.xii.1964 (*P. J. M. & P. Greenslade*) (BMNH).

Paratypes. SOLOMON ISLANDS: Santa Isabel, Buala, 14.xii.1964 (*P. J. M. & P. Greenslade*), 4 ♀ (BMNH); S.I., Tatamba, 27.ix.1965 (*P. N. Lawrence*), 1 ♀ (BMNH); Nggela, Vatilai, 14.vi.1965, 1 ♀; N., Soso, 2.xi.1965, 1 ♀ (all *P. J. M. & P. Greenslade*) (all BMNH); Guadalcanal, Kukum, 15.xii.1964, 16 ♀, 2 m.j., 3 l II; G., Kukum, vi.-vii.1966, 6 ♀ (all *P. J. M. & P. Greenslade*) (all BMNH); G., Lunga, viii.1966 (*P. J. M. & P. Greenslade*), 46 ♀, 1 m.j., 1 l I (BMNH). BISMARCK ARCHIPELAGO: Duke of York, Manuan, 21.vii.1962 (*Noona Dan Expedition*) 1 ♀ (UZM).

This new species is named in honour of Dr P. J. M. and Mrs P. Greenslade, who made such a rich proturan collection in the Solomon Islands.

G. greensladei is peculiar, among all known forms of this genus, in the position of foretarsal sensillae *c*, *d*, *e*, and *f*, as well as in the size of *a* and *b*.

KEY TO THE KNOWN SPECIES OF *GRACILENTULUS*

- 1 Canal of maxillary gland with long proximal part with two or three oval dilatations along the very narrow tube 2
- Canal of maxillary gland with short proximal part with end dilatation 6
- 2 Sensilla *b* shorter than half of *a* 3
- Sensilla *b* longer than *a* 5
- 3 Sensilla *b* extremely short and thin, only reaching γ 2; *b'* and *t*-2 in a line 4
- Sensilla *b* almost reaching base of γ 3 and surpassing *t*-2; *b'* midway between *t*-2 and α 4; *a* surpassing *t*-2; terg. I-VI with six anterior setae . **japonicus** (Imadaté, 1961)
- 4 Sensilla *a* only just reaching *c*; terg. V-VI with only four anterior setae
malaysiensis Imadaté, 1964
- Sensilla *a* reaching *t*-2; terg. V-VI with six anterior setae (or eight)
kenyanus (Condé, 1948)
- 5 Sensilla *b* very long, almost reaching *g*; *a* reaching γ 3; smaller, foretarsus about 50 μm **ohyamai** Imadaté, 1964
- Sensilla *b* shorter, hardly reaching *e*; *a* reaching γ 2; bigger, foretarsus about 75 μm
sanjianus Imadaté, 1964
- 6 Sternite VIII with two posterior setae 7
- Sternite VIII with only the four anterior setae 8
- 7 Canal of maxillary gland long, as long as proximal branch of fulcrum; *b'* present; terg. VII with eight anterior setae **tasmanicus** Tuxen, 1967
- Canal of maxillary gland short, half the proximal branch of fulcrum; *b'* absent; in terg. VII *A* 1 is missing **similis** Tuxen, 1967
- 8 Sensilla *b'* missing; *b* as long as *c* and *d*; comb VIII with short teeth
floridanus (Ewing, 1924)

TABLE 3
Chaetotaxy of *Gracilentulus greensladei*

	Larva I		Larva II		Mat. jun.		Adult	
	Form.	Prim. setae	Form.	Sec. setae	Form.	Tert. set.	Form.	Compl. setae
(Dorsal)								
Th.I	4	1, 2	4		4		4	
II—III	$\frac{4}{8}$	<i>A</i> 2, <i>M</i> <i>P</i> 1,2,3,5 (4?)	$\frac{6}{14(12)}$	<i>A</i> 4 <i>P</i> 1 <i>a</i> , (2 <i>a</i>), 4	$\frac{6}{14}$		$\frac{6}{14}$	
Abd. I	$\frac{0}{8}$	<i>P</i> 1,2,3,5	$\frac{0}{10}$	<i>P</i> 2 <i>a</i>	$\frac{6}{10}$	<i>A</i> 1,2,5	$\frac{6}{12}$	<i>P</i> 1 <i>a</i>
II—III	$\frac{0}{10}$	<i>P</i> 1,2,3,4,5	$\frac{0}{12(14)}$	<i>P</i> 2 <i>a</i> , (4 <i>a</i>)	$\frac{4}{14}$	<i>A</i> 2,5	$\frac{4}{16}$	<i>P</i> 1 <i>a</i>
IV—VI	$\frac{0}{10}$	<i>P</i> 1,2,3,4,5	$\frac{0}{14(12)}$	<i>P</i> 2 <i>a</i> , (4 <i>a</i>)	$\frac{4}{14}$	<i>A</i> 2,5	$\frac{4}{16}$	<i>P</i> 1 <i>a</i>
VII	$\frac{0}{10}$	<i>P</i> 1,2,3,4,5	$\frac{0}{14}$	<i>P</i> 2 <i>a</i> , 4 <i>a</i>	$\frac{2}{16}$	<i>A</i> 5 <i>P</i> 3 <i>a</i>	$\frac{2}{18}$	<i>P</i> 1 <i>a</i>
VIII	$\frac{0-6}{6}$	<i>M</i> 2,3,4 <i>P</i> 1,2,4	$\frac{2-6}{8}$	<i>A</i> 3 <i>P</i> 3	$\frac{4-7}{8}$	<i>A</i> 5, <i>M</i> <i>c</i>	$\frac{4-7}{8}$	
IX			8	1,3,4,5	10	2	12	3 <i>a</i>
X					8	1,3,4,5	12(10)	2, (3 <i>a</i>)
XI					6		6	
Telson	9		9		9		9	
(Ventral)								
Th.I	?		$\frac{2-2}{4}$	<i>A</i> 1, <i>M</i> 1 <i>P</i> 1, 2	$\frac{4-2}{6}$	<i>A</i> 2 <i>P</i> 3	$\frac{4-2}{6}$	
II—III	?		$\frac{5-2}{2}$	<i>A</i> <i>c</i> , 2, 3, <i>M</i> <i>P</i> 1	$\frac{5-2}{4}$	<i>P</i> 2	$\frac{7(5)-2}{4}$	(<i>A</i> 4)
Abd. I	$\frac{0}{2}$	<i>P</i> 1	$\frac{3}{2}$	<i>A</i> <i>c</i> , 2	$\frac{3}{2}$		$\frac{3}{4}$	<i>P</i> 2
II—III	$\frac{0}{3}$	<i>P</i> <i>c</i> , 3	$\frac{1(0)}{5(3)}$	<i>A</i> <i>c</i> <i>P</i> 2	$\frac{3}{5}$	<i>A</i> 2	$\frac{3}{5}$	
IV—VII	$\frac{1}{4}$	<i>A</i> <i>c</i> <i>P</i> 2,3	$\frac{1}{6}$	<i>P</i> 1	$\frac{3}{8}$	<i>A</i> 2 <i>P</i> 1 <i>a</i>	$\frac{3}{8}$	
VIII	$\frac{2}{0}$	2	$\frac{4}{0}$	1	$\frac{4}{0}$		$\frac{4}{0}$	
IX			4		4		4	
X					4		4	
XI					0(2)	(2)	6(4)	1,3
Telson	8		8		6		6	

- Sensilla *b'* present; *b* shorter or longer than *c* 9
- 9 Sensilla *b* longer than *c*, reaching *t*-3; *b*-*c*-*d* in a line; *f* close to *e*; terg. II-VI with four anterior setae, terg. VII with only two (*A* 5) *greensladei* sp. n. (p. 340)
- Sensilla *b* shorter than *c*; *d* distal to *b*-*c*; terg. II-VI with six anterior setae 10
- 10 Sensilla *f* close to *e* *sachikoeae* Imadaté, 1964
- Sensilla *f* midway between *e* and *g* 11
- 11 Sensilla *b* short, just surpassing base of *d* *meridianus* (Condé, 1945)
- Sensilla *b* longer, reaching base of *e* *gracilis* (Berlese, 1908)

PROTENTOMIDAE

Twelve protentomid specimens belonging to a single species of the genus *Condeellum* are present. It is interesting to note that they were all collected from Mt Austen (330 m) on Guadalcanal Island.

Condeellum crucis sp. n.

(Text-figs 22-35)

Body length 790-820 μ m in well expanded adults.

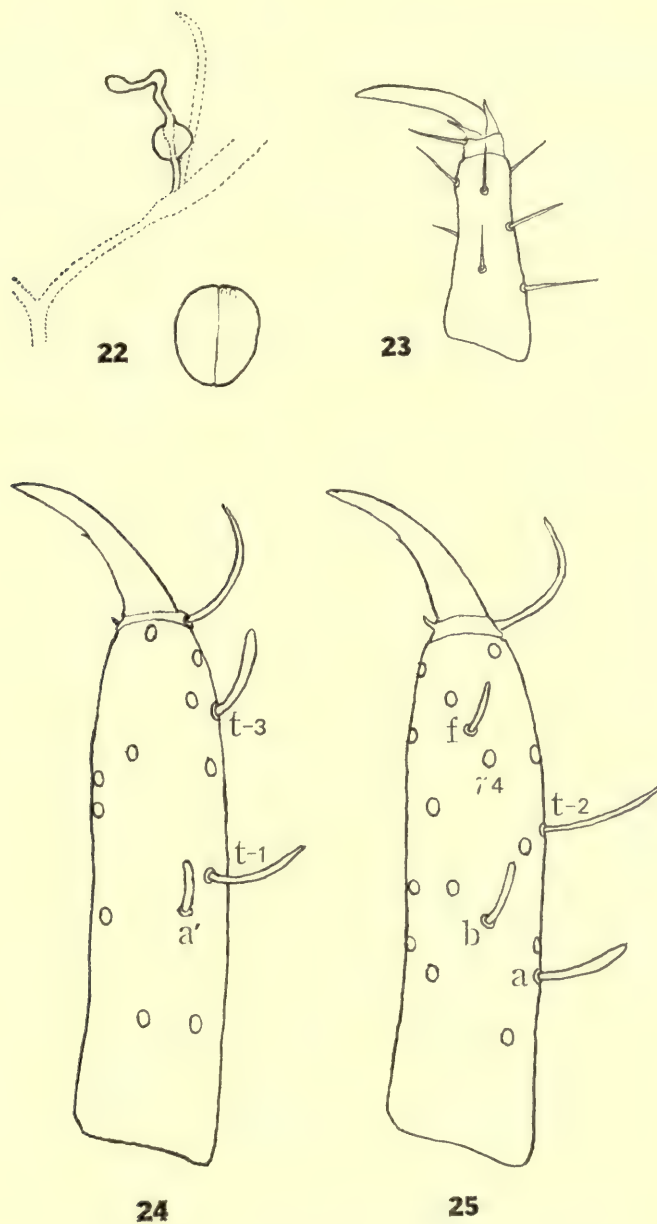
Mouthparts rather broad; mandible not pointed, but has a blunt end with possibly a few minute teeth; maxillary and labial palpi ornamented with a tuft of setae apically; lobus internus of maxilla rather broad and lobus externus pointed distally; labium with five setae: three relatively long and situated along the outer margin, one short seta placed near to inner margin and a little distal to the palpus, and one short seta at the tip, as in all other members of this genus. Pseudoculus oval, *PR* = 9-10; canal of the maxillary gland of the normal shape for the genus, proximal part sharply bent at about halfway between the heart-shaped dilatation and the end.

Foretarsus 36-44 μ m in length, claw with an inner tooth, *TR* = 2.7-2.9; empodium short, *EU* = 0.1; position and shape of foretarsal sensillae similar to that of other members of the genus. Dorsal sensilla *t*-1 not broadened, *BS* = 1.0; *t*-2 a little thinner than *t*-1 and pointed apically; *t*-3 broad; exterior sensilla *a* subequal to *t*-3 in shape and length; *b* and *f* slightly broadened, but smaller than *a*; *f* placed a little ventrally and distally to γ 4; *c*, *d*, *e* and *g* absent; interior sensilla *a'* proximal to *t*-1, short and slightly broad; *b'* and *c'* absent. Middle and hind tarsi have long empodia and tunica-lobes; middle tarsus 18-21 μ m, and its claw 10-13 μ m; hind tarsus 19-22 μ m and its claw 11-14 μ m.

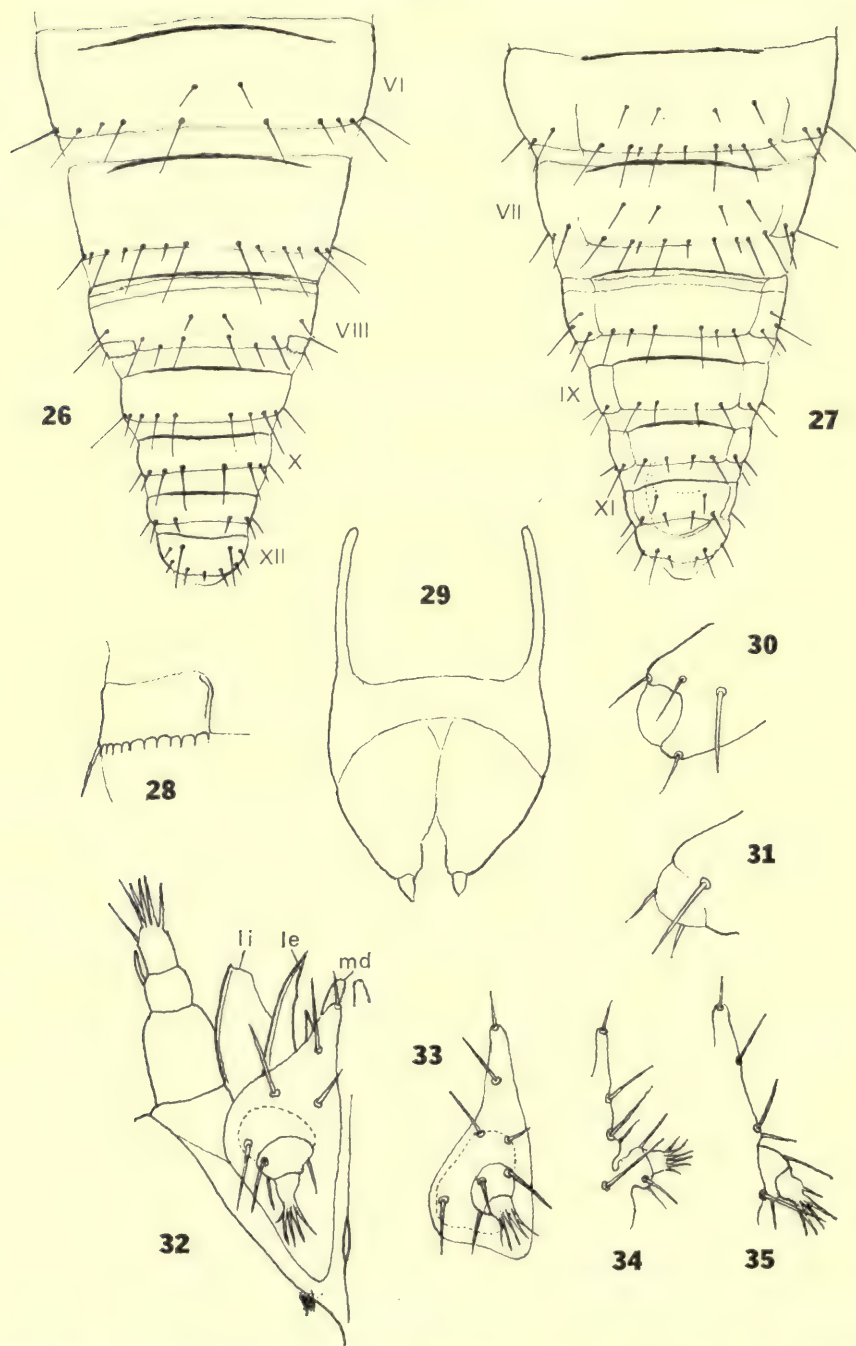
Thorax I with two pairs of dorsal setae, pair 1a absent. Thorax II-III with dorsal *P* 5 rudimentary. Abdominal terg. I-VI with only a single pair of anterior setae, *A* 1, terg. VII no anterior setae. Stern. II-VII with a central seta, *P* c, present in the posterior row. Abdominal appendages I-II two-segmented with four setae; III rudimentary with two short apical and one long subapical seta. Comb on abdomen VIII consists of about 10 small teeth; female squama genitalis with pointed acrostylus.

Chaetotaxy as in Table 4.

Maturus junior. Foretarsus 33-35 μ m. Important characters such as foretarsal sensillae, canal of the maxillary gland, etc., as in the adult. In comparison with the chaetotaxy of the adult, setae 2 on abd. terg. X, setae 1 and 3 on stern. XI, are absent.



FIGS 22-25. *Condeellum crucis*. 22, pseudoculus and canal of maxillary gland; 23, hindtarsus; 24, 25, foretarsus, (24) interior and (25) exterior views.



FIGS 26-35. *Condeellum crucis*. 26, 27, chaetotaxy of abd. VI-XII, (26) dorsal and (27) ventral views; 28, comb of terg. VIII; 29, female squama genitalis; 30, abdominal appendage II; 31, abdominal appendage III; 32, mouthparts, ventral view; 33-35, labium in lateral view of (33) *C. ishiiianum*, (34) *C. matobai* and (35) *C. regale*.

Holotype ♀, SOLOMON ISLANDS: Guadalcanal, Mt Austen, 330 m, 11.ii.1966 (BMNH).

Paratypes. Same data as holotype, 6 ♀, 1 m.j.; 28.iii.1966, 1 ♀; 7-10.vi.1966, 1 ♀; 10.viii.1966, 2 ♀ 2 m.j. (all *P. J. M.* & *P. Greenslade*) (all BMNH).

The species name is derived from the Latin word 'crux' in reference to the Southern Cross, the famous constellation of the southern hemisphere.

This new species is peculiar among *Condeellum* in the absence of anterior setae on abdominal terg. VII. All known species of this genus may be separated by the chaetotaxy of the abdominal terg. II-VII, as given in the following key.

TABLE 4
Chaetotaxy of *Condeellum crucis*

(Dorsal)			(Ventral)		
Formula	Composition of setae		Formula	Composition of setae	
Th.I	4	1,2	Th.I	$\frac{2-4}{6}$	<i>A</i> <i>M</i> 1,2 <i>P</i> 1,2,3
II-III	$\frac{6}{12}$	<i>A</i> 2,4, <i>M</i> <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4	II	$\frac{4-2}{4}$	<i>A</i> 1,2, <i>M</i> <i>P</i> 1, 2
Abd.I	$\frac{2}{14}$	<i>A</i> 1 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,5	III	$\frac{6-2}{4}$	<i>A</i> 1,2,3, <i>M</i> <i>P</i> 1, 2
II-VI	$\frac{2}{14}$	<i>A</i> 1 <i>P</i> 1,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	Abd.I	$\frac{4}{2}$	<i>A</i> 2,3 <i>P</i> 1
VII	$\frac{0}{18}$	<i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,3 <i>a</i> ,4,4 <i>a</i> ,5	II-III	$\frac{4}{5(3)}$	<i>A</i> 2,3 <i>P</i> <i>c</i> , (2),3
VIII	$\frac{6-6}{8}$	<i>A</i> 1,3,5, <i>M</i> 2,3,4 <i>P</i> 1,2,3,4	IV-VI	$\frac{4}{7(9)}$	<i>A</i> 2,3 <i>P</i> <i>c</i> ,1, (1 <i>a</i>), 2,3
IX	12	1,2,3,3 <i>a</i> ,4,5	VII	$\frac{4}{9}$	<i>A</i> 2,3 <i>P</i> <i>c</i> ,1,1 <i>a</i> ,2,3
X	10	1,2,3,4,5	VIII	6	1,1 <i>a</i> ,2
XI	6		IX-X	4	
Telson	9		XI	6	1,2,3
			Telson	6	

KEY TO THE KNOWN SPECIES OF *CONDEELLUM*

- 1 Abdominal terg. II-VI with a single pair of anterior setae, *A* 1 2
- Abdominal terg. II-VI with two or three pairs of anterior setae (including a pleural pair, *A* 5) 3
- 2 Terg. VII with two pairs of anterior setae, *A* 1 and 5; foretarsus 46 μ m (Japan) *matobai* Imadaté, 1973

- Terg. VII without anterior setae; foretarsus 36–44 μm (Solomon Is.) *crucis* sp.n. (p. 346)
- 3 Terg. II–VI with three pairs of anterior setae, *A* 1, 2 and 5; terg. VII with *A* 4 and 5; foretarsus 42–54 μm (Thailand, Borneo) *ishitani* Imadaté, 1965
- Terg. II–VI with two pairs of anterior setae *A* 1 and 5; terg. VII with *A* 4 (as in Condé, 1958) and 5; foretarsus 50–55 μm (Réunion, Nepal and Thailand)

regale (Condé, 1958)

EOSENTOMIDAE

There are 315 specimens from more than 35 different localities in the present collection. Six of these are indeterminable, owing to their condition; the 309 remaining specimens have been placed in eight species as follows: *Eosentomon oceaniae* sp. n., *E. melanesiense* sp. n., *E. solare* sp. n., *E. sakura* Imadaté & Yosii, *E. solomonense* sp. n., *E. guadalcanalense* sp. n., *E. notiale* sp. n., *E. noonadanae* sp. n.

The first species, *oceaniae*, belongs to the 'swani-group' (Tuxen, 1964: 132) which has been recorded from East Asia, Australia and South America, and the next five to the 'kumei-group' (loc. cit.: 139), found in both the tropical and temperate areas of East Asia (Imadaté, 1965). The seventh species, *notiale*, is regarded as a member of the 'saharensen-group' on account of the long empodium of the hind leg (Tuxen 1964: 145), although as in *E. udagawai* Imadaté it may be more natural to arrange it into the 'kumei-group' on the structure of the female squama genitalis. The last species, *noonadanae*, is peculiar among all known forms of eosentomids, not only in the structure of the female squama genitalis, but also in the chaetotaxy.

Eosentomon oceaniae sp. n.

(Text-figs 36–40)

[*Eosentomon tankoktongi* Imadaté sensu Tuxen, 1967: 6. Misidentification.]

Body length usually 1000–1200 μm in expanded adults.

Mouthparts normal; labral setae present; clypeal apodeme distinct; pseudoculus rather small, *PR* = 12–13.

Foretarsus usually 94–104 μm in length, *TR* = 5.2–5.4 and *EU* = 1.0, dorsal sensilla *t*–1 placed at about halfway between α 3 and α 3', *BS* = 1.2–1.3; *t*–2 thin; apex of *t*–3 almost reaching base of α 7; exterior sensilla *a* relatively long, apex reaching level of α 3; *b* and *c* normal; *d* situated a little proximal to *y*; spatulate *e* and *g* present; *f*–1 seta-like and *f*–2 short; interior sensilla *a'* stout; *b'*–1 placed about level with α 3'; *b'*–2 normal and *c'* slightly thickened. Hind tarsal empodium short and less than one-fifth the claw length.

Thoracic chaetotaxy normal. On abdominal terg. IV–VI, *A* 1, 2 and 3 absent; *A* 4 often missing on terg. VI or V and VI; on terg. VII *A* 1, 2, 3 and 4 lacking. Tergal accessory setae *P* 1a on terg. VI–VII short, not filiform, less than one-fifth of *P* 1 and situated in the same row as *P* 1 and 2. *P* 2 and 1'' on terg. VIII not displaced.

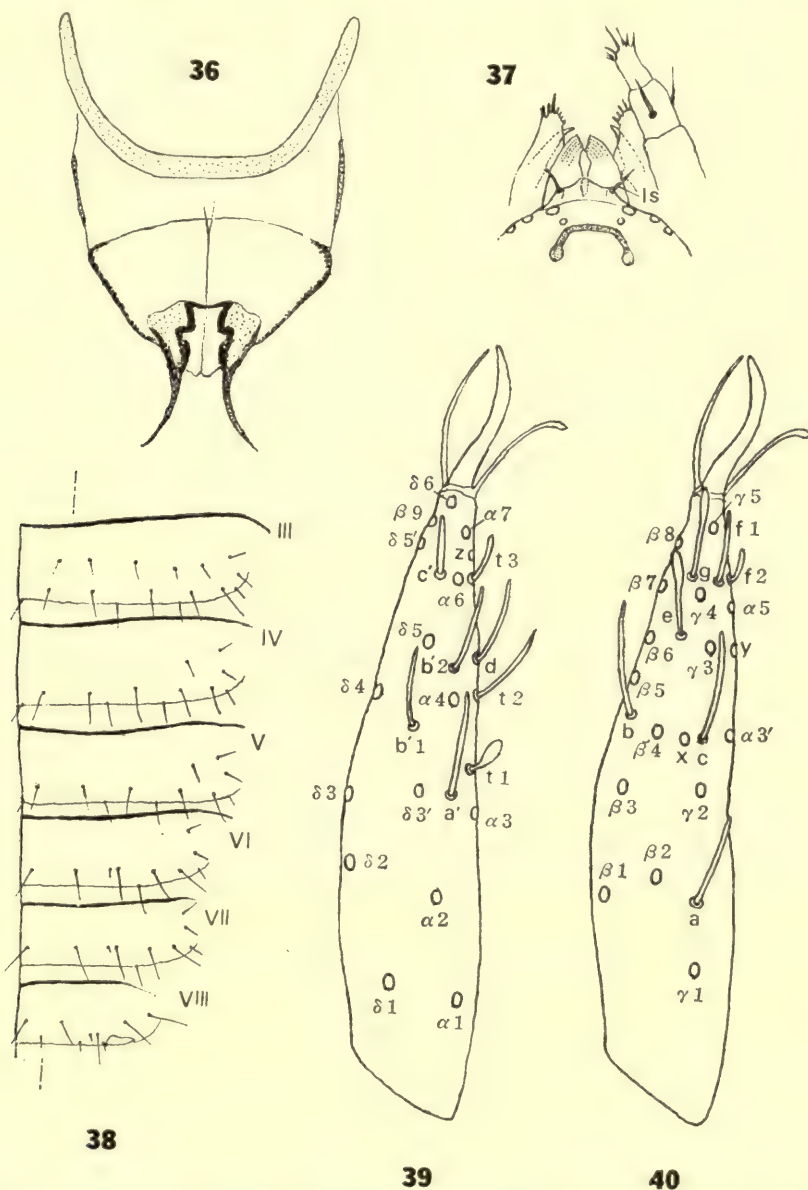
Female squama genitalis resembles that of *E. swani* Womersley and its allies; caput processus bent against the median edge of stylus in a sharp angle, lateral sclerotization present.

Maturus junior. Foretarsus 80–88 μm . Important characters such as foretarsal sensillae, chaetotaxy, etc. as in the adult with the exception of the absence of setae 2 and 4 on abdominal stern. XI.

Larva II. Foretarsus 68–74 μm . Clypeal apodeme indistinct, position and shape of the foretarsal sensillae are not different from those of the adult.

Larva I. Foretarsus 72 μm in the specimen from Betimatu, Guadalcanal Island. Clypeal apodeme indistinct; position and shape of the foretarsal sensillae similar to those of larva II and adult.

Chaetotaxy as in Table 5.



FIGS 36-40. *Eosentomon oceaniae*. 36, female squama genitalis; 37, mouthparts, dorsal view (ls = labral setae); 38, tergal chaetotaxy of abd. III-VIII; 39, 40, foretarsus, (39) interior and (40) exterior views.

Holotype ♀, SOLOMON ISLANDS: Guadalcanal, Mt Austen, 11.ii.1966 (*P. J. M. & P. Greenslade*) (BMNH).

Paratypes. BISMARCK ARCHIPELAGO: Mussau, Boliu, 4.vi.1962, 1 ♀; Lavongai, Banatam, 20.iii.1962, 1 m.j.; 26.iii.1962, 1 ♂; Dyaul, Sumuna, 7.iii.1962, 1 ♂, 3 ♀; D., Kollepine, 12.iii.1962, 1 ♀; New Ireland, Lemkamin, 23.iv.1962, 1 ♂, 1 ♀, 3 l II; Duke of York, Manuan, 21.vii.1962, 1 ♂, 2 ♀, 1 l II; New Britain, Valoka, 13.vii.1962, 1 ♂, 10 ♀, 3 m.j., 2 l II, 1 l I (all *Noona Dan Expedition*) (all UZM). SOLOMON ISLANDS: Choiseul, Katurasele, 23.xii.1965 (*P. J. M. & P. Greenslade*), 1 ♂; Kolombangara, north of Kuzi, 6.ix.1965 (*P. N. Lawrence*), 1 ♂; Santa Isabel, Buala, 14.xii.1964, 4 ♂, 1 l II; 12.ii.1965, 1 ♂ (all *P. J. M. & P. Greenslade*); Russell, Yandina, 15.viii.1966, 1 ♂; R., not localized, 18.iii.1965 (*P. J. M. & P. Greenslade*), 1 m.j.; Nggela, Vatilau, 14.vi.1965 (*P. J. M. & P. Greenslade*), 1 ♂, 1 ♀, 1 m.j.; Savo, One Naika, 1.vi.1965 (*P. J. M. & P. Greenslade*), 2 ♂, 4 ♀, 1 l II; Guadalcanal, Mt Austen, 13.xi.1964, 1 ♂, 2 ♀; 24.x.1964, 1 ♀; 11.ii.1966, 9 ♂, 5 ♀, 2 m.j., 1 l II; 10.viii.1966, 1 ♂, 5 ♀, 2 m.j. (all *P. J. M. & P. Greenslade*); G., Mt Popamanase, 2100 m, 26.vi.1965 (*P. J. M. & P. Greenslade*), 1 m.j.; G., Betimatu, 30.iv.1965 (*P. J. M. & P. Greenslade*), 1 l I (all BMNH); G., Honiara, 4.viii.1962 (*Noona Dan Expedition*), 1 ♀ (UZM); G., Lunga, viii. 1966 (*P. J. M. & P. Greenslade*), 4 ♂; Malaita, Dala, 16.ii.1965 (*P. J. M. & P. Greenslade*), 1 ♂; Bellona, 28.v.1965 (*P. J. M. & P. Greenslade*), 1 ♂, 1 m.j.; Rennell, Kagaba Bay, 6.iv.1965 (*P. J. M. & P. Greenslade*), 1 ♀ (all BMNH); R., Niupani, 18.viii.1962, 3 ♂, 2 ♀; 19.viii.1962, 1 ♂ (all *Noona Dan Expedition*) (all UZM).

FURTHER DISTRIBUTION. Australia (Tuxen, 1967, as *tankoktongi* Imadaté).

It is likely that this form is the commonest eosentomid in Melanesia. *E. oceaniae* is similar to *E. tankoktongi* Imadaté from Borneo. The important characters such as the position and shape of the foretarsal sensillae and of the tergal accessory setae *P 1a* on abdominal terg. VI–VII are almost the same in both, but the tergal setae *A 1*, 2, and 3 on abdominal terg. IV are always absent in the Melanesian specimens examined as well as in the Australian specimen examined by Tuxen (1967). The above difference in chaetotaxy seems to be significant and it is reasonable to regard the Melanesian and Australian form as different from *E. tankoktongi*.

Eosentomon melanesiense sp. n.

(Text-figs 41–46)

Body length is usually 700–900 μ m in expanded adults.

Mouthparts normal; labral setae present; clypeal apodeme distinct; pseudoculus rather small, *PR* = 11–13.

Foretarsus 73–77 μ m in length, *TR* = 4.7–5.1 and *EU* = 1.0; position and shape of foretarsal sensillae similar to those of *E. oceaniae*. Dorsal sensilla *t*–1 situated at about halfway between α 3 and α 3', *BS* = 1.2; apex of exterior sensilla *a* slightly surpassing level of α 3; spatulate *e* and *g* normal; interior sensilla *b'*–1 present; empodium of hind tarsus short and less than one-fifth claw length.

Thoracic chaetotaxy normal. On abdominal terg. IV–VI *A 1*, 2 and 3 absent and *A 4* often also missing; on terg. VII *A 1*, 2, 3 and 4 absent and *P 1a* short, not filiform, less than one-fifth

TABLE 5
Chaetotaxy of *Eosentomon oceaniae*

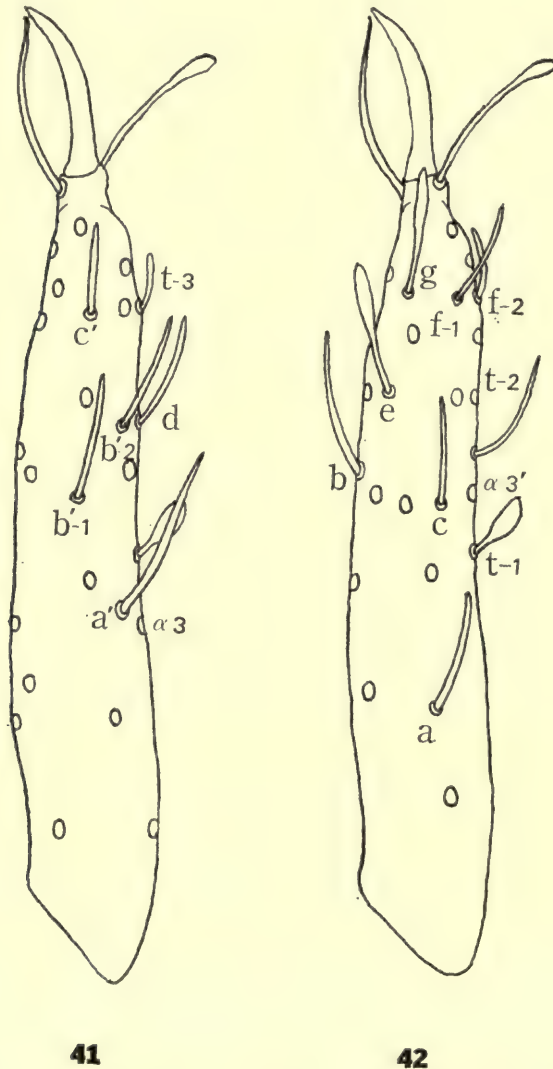
	Larva I		Larva II		Mat. jun.		Adult	
	Form.	Prim. setae	Form.	Sec. setae	Form.	Tert. setae	Form.	Compl. setae
(Dorsal)								
Th.I	2	1	4	2	4		4	
II	$\frac{4}{12}$	$A\ 2, M$	$\frac{6}{14}$	$A\ 4$	$\frac{6}{16}$		$\frac{6}{16}$	
		$P\ 1, 1a, 2, 3, 4, 5$		$P\ 2a$		$P\ 3a$		
III	$\frac{4}{10}$	$A\ 2, M$	$\frac{6}{12}$	$A\ 4$	$\frac{6}{16}$		$\frac{6}{16}$	
		$P\ 1, 1a, 2, 3, 4$		$P\ 2a$		$P\ 3a, 5$		
Abd.I	$\frac{0}{6?}$	$P\ 1, 1a, 2$	$\frac{0}{8?}$	$P\ 3?$	$\frac{4}{10}$	$A\ 1, 2$	$\frac{4}{10}$	
						$P\ 4$		
II	$\frac{0}{12}$	$P\ 1, 1a, 2, 3, 4, 5$	$\frac{2}{16}$	$A\ 5$	$\frac{10}{16}$	$A\ 1, 2, 3, 4$	$\frac{10}{16}$	
				$P\ 2a, 4a$				
III	$\frac{0}{12}$	$P\ 1, 1a, 2, 3, 4, 5$	$\frac{4}{16}$	$A\ 4, 5$	$\frac{10}{16}$	$A\ 1, 2, 3$	$\frac{10}{16}$	
				$P\ 2a, 4a$				
IV	$\frac{0}{12}$	$P\ 1, 1a, 2, 3, 4, 5$	$\frac{4}{16}$	$A\ 4, 5$	$\frac{4}{16}$		$\frac{4}{16}$	
				$P\ 2a, 4a$				
V-VI	$\frac{0}{12}$	$P\ 1, 1a, 2, 3, 4, 5$	$\frac{4(2)}{16}$	$A\ 5, (4)$	$\frac{4(2)}{16}$		$\frac{4(2)}{16}$	
				$P\ 2a, 4a$				
VII	$\frac{0}{12}$	$P\ 1, 1a, 2, 3, 4, 5$	$\frac{2}{16}$	$A\ 5$	$\frac{2}{16}$		$\frac{2}{16}$	
				$P\ 2a, 4a$				
VIII	$\frac{6}{7}$	$A\ 1, 2, 3$	$\frac{6}{9}$		$\frac{6}{9}$		$\frac{6}{9}$	
		$P\ c, 1', 2, 2'$		$P\ 1''$				
IX			8		8		8	
X-XI					8		8	
Telson	9		9		9		9	
(Ventral)								
Th.I-II	$\frac{4-2}{2}$	$A\ 1, 2, M$	$\frac{6-2}{6}$	$A\ 3$	$\frac{6-2}{6}$		$\frac{6-2}{6}$	
		$P\ 2$		$P\ 1, 3$				
III	$\frac{4-2}{2}$	$A\ 1, 2, M\ 1$	$\frac{6-2}{6}$	$A\ 3$	$\frac{6-4}{8}$	$M\ 2$	$\frac{6-4}{8}$	
		$P\ 2$		$P\ 1, 3$		$P\ 2a$		
Abd.I	$\frac{4}{2}$	$A\ 1, 2$	$\frac{4}{4}$		$\frac{4}{4}$		$\frac{4}{4}$	
		$P\ 1$		$P\ 2$				
II-III	$\frac{2}{4}$	$A\ 1$	$\frac{4}{4}$	$A\ 2$	$\frac{6}{4}$	$A\ 3$	$\frac{6}{4}$	
		$P\ 1, 2$						
IV-VII	$\frac{2}{6}$	$A\ 1$	$\frac{4}{8}$	$A\ 2$	$\frac{6}{10}$	$A\ 3$	$\frac{6}{10}$	
		$P\ 1, 2, 3$		$P\ 2a$		$P\ 2a'$		
VIII	$\frac{0}{5}$		$\frac{0}{7}$		$\frac{0}{7}$		$\frac{0}{7}$	
		$P\ c, 1, 2$		$P\ 1a$				
IX			4	1, 2	4		4	
X					4	1, 2	4	
XI					4	1, 3	8	2, 4
Telson	12		12		12		12	

of *P* 1 and situated in the same row as *P* 1 and 2; *P* 2 and 1'' on terg. VIII not displaced; setae 1, 2 and 3 on terg. X and setae 1 and 2 on terg. XI absent.

Female squama genitalis characterized by the distinctive S-like shape of the combined caput and corpus processus in the processus sternalis.

Maturus junior. Foretarsus 63–72 μ m. Important characters such as foretarsal sensillae, chaetotaxy, etc. not different from those of adult except for absence of setae 2 and 4 on abdominal stern. XI.

Larva II. Foretarsus 51–66 μ m; position and shape of foretarsal sensillae similar to those



FIGS 41, 42. *Eosentomon melanesiense*. Foretarsus, (41) interior and (42) exterior views.

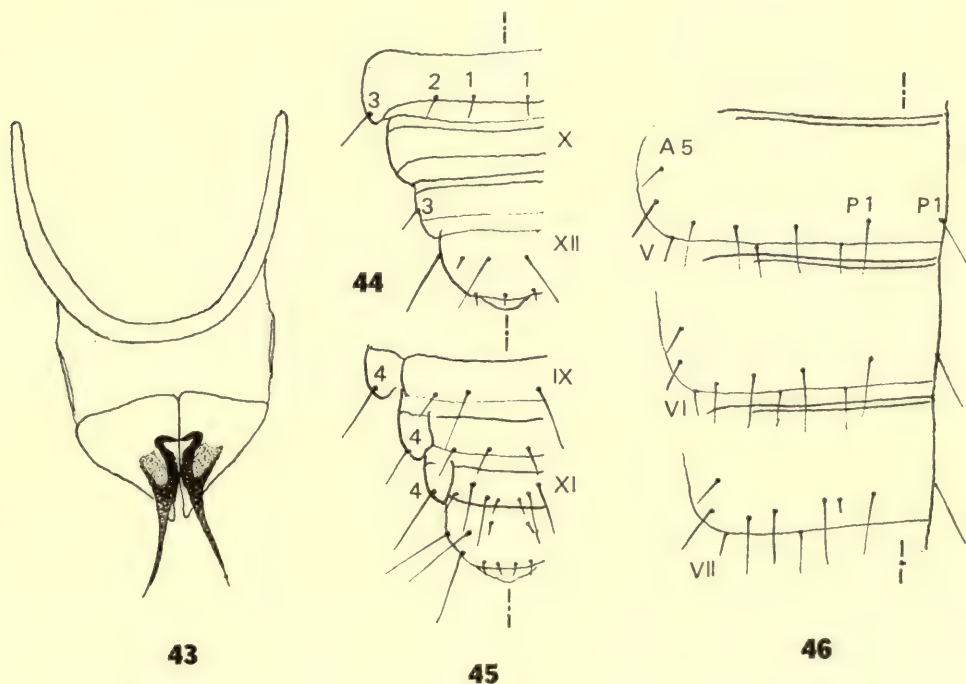
of *maturus junior*. Except for shape and position of *P* 1a on abdominal terg. VI, chaetotaxy not different from that of same stage of *E. oceaniae*.

Larva I. Foretarsus 45–52 μ m. Except for shape and position of *P* 1a on abdominal terg. VI, chaetotaxy as in same stage of *E. oceaniae*.

Chaetotaxy as in Table 6.

Holotype ♂, SOLOMON ISLANDS: Guadalcanal, Mt Austen, 11.ii.1966 (*P. J. M. & P. Greenslade*) (BMNH).

Paratypes. BISMARCK ARCHIPELAGO: Mussau, Malakata, 11.vi.1962 (*Noona Dan Expedition*) 1 ♀; Lavongai, Banatam, 20.iii.1962, 3 ♂, 5 ♀, 2 m.j.; 23.iii.1962, 2 ♂ 1 ♀, 1 m.j.; 26.iii.1962, 7 ♂, 10 ♀, 1 l I (all *Noona Dan Expedition*); New Britain, Valoka, 13.vii.1962 (*Noona Dan Expedition*), 1 l II (all UZM). SOLOMON ISLANDS: Wagina, 25.v.1966 (*P. J. M. & P. Greenslade*), 1 ♂, 1 ♀; Kolombangara, north of Kuzi, 6.ix.1965 (*P. N. Lawrence*), 1 ♀; Santa Isabel, Buala, 14.xii.1964 (*P. J. M. & P. Greenslade*), 1 ♂, 1 ♀, 1 l II; Savo, Koela, 1.vi.1965 (*P. J. M. & P. Greenslade*), 1 ♀; Guadalcanal, Mt Austen, 24.viii.1965 (*P. N. Lawrence*), 1 ♀; 24.v.1965, 1 ♂, 3 ♀, 1 m.j.; 11.ii.1966, 13 ♂, 18 ♀, 3 m.j.; 10.viii.1966, 7 ♂, 18 ♀, 2 l I (all *P. J. M. & P. Greenslade*); G., Mt Jonapau, 1100 m, 6.v.1965 (*P. J. M. & P. Greenslade*), 1 ♀; G., Mt Popamanaseu, 1500 m, x.1965 (*P. J. M. & P. Greenslade*), 1 ♀; G., Berande Point, 30.iv.1965 (*P. J. M. & P. Greenslade*), 1 ♂; G., Lunga, viii. 1966 (*P. J. M. & P. Greenslade*), 3 ♀, 1 m.j., 1 l I (all BMNH).



FIGS 43–46. *Eosentomon melanesiense*. 43, female squama genitalis; 44, 45, chaetotaxy of abd. IX–XII, (44) dorsal and (45) ventral views; 46, tergal chaetotaxy of abd. V–VII.

TABLE 6

Chaetotaxy of *Eosentomon melanesiense*

(Dorsal)			(Ventral)		
Formula	Composition of setae		Formula	Composition of setae	
Th.I	4	1, 2	Th.I-II	$\frac{6-2}{6}$	<i>A</i> 1, 2, 3, <i>M</i> <i>P</i> 1, 2, 3
II-III	$\frac{6}{16}$	<i>A</i> 2, 4, <i>M</i> 1, 1 <i>a</i> , 2, 2 <i>a</i> , 3, 3 <i>a</i> , 4, 5	III	$\frac{6-8}{8}$	<i>A</i> 1, 2, 3, <i>M</i> 1, 2 <i>P</i> 1, 2, 2 <i>a</i> , 3
Abd.I	$\frac{4}{10}$	<i>A</i> 1, 2 <i>P</i> 1, 1 <i>a</i> , 2, 3, 4	Abd.I	$\frac{4}{4}$	<i>A</i> 1, 2 <i>P</i> 1, 2
II-III	$\frac{10}{16}$	<i>A</i> 1, 2, 3, 4, 5 <i>P</i> 1, 1 <i>a</i> , 2, 2 <i>a</i> , 3, 4, 4 <i>a</i> , 5	II-III	$\frac{6}{4}$	<i>A</i> 1, 2, 3 <i>P</i> 1, 2
IV-VI	$\frac{2(4)}{16}$	<i>A</i> 5, (4) <i>P</i> 1, 1 <i>a</i> , 2, 2 <i>a</i> , 3, 4, 4 <i>a</i> , 5	IV-VII	$\frac{6}{10}$	<i>A</i> 1, 2, 3 <i>P</i> 1, 2, 2 <i>a</i> , 2 <i>a'</i> , 3
VII	$\frac{2}{16}$	<i>A</i> 5 <i>P</i> 1, 1 <i>a</i> , 2, 2 <i>a</i> , 3, 4, 4 <i>a</i> , 5	VIII	$\frac{0}{7}$	<i>P</i> <i>c</i> , 1, 1 <i>a</i> , 2
VIII	$\frac{6}{9}$		IX-X	4	
IX	8	1, 2, 3, 4	XI	8	
X	2	4	Telson	12	
XI	4	3, 4			
Telson	9				

The present new species and the following species, *E. solare*, are closely similar to *E. dawsoni* Condé from New Zealand and *E. wygodzinskyi* Bonet from Brazil in important characters such as the peculiar pattern of the chaetotaxy on abdomen X-XI as well as the shape and position of foretarsal sensillae. *E. melanesiense* is distinguishable by the absence of *A* 1, 2 and 3 on abdominal terg. IV and by the shape of the female squama genitalis (from *E. dawsoni*). Significant difference of body size is also denotable between this species and *E. dawsoni*.

***Eosentomon solare* sp. n.**

(Text-figs 47-50)

Body length usually 700-900 μ m in expanded adults.

Mouthparts normal; clypeal apodeme distinct; labral setae present; pseudoculus of medium size, *PR* = 10-11.

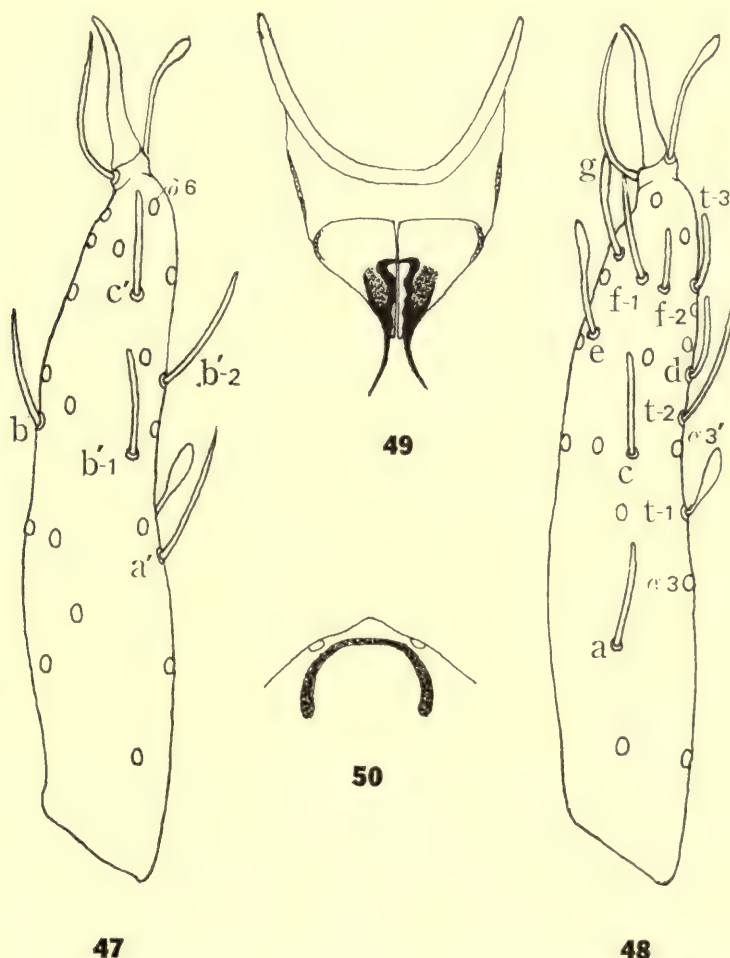
The foretarsus is 70-76 μ m in length, *TR* = 4.8-5.1 and *EU* = 1.0; position and shape of foretarsal sensillae similar to those in *E. melanesiense*; dorsal sensilla *t*-1 situated about halfway between α 3 and α 3', *BS* = 1.1-1.2; apex of exterior sensilla *a* clearly surpasses level of α 3; spatulate sensillae *e* and *g* normal; interior sensilla *b'*-1 present. Empodium of hind tarsus short and less than one-fifth claw length.

Thoracic chaetotaxy normal. Abdominal chaetotaxy similar to that of *E. wygodzinskyi* Bonet and *E. dawsoni* Condé. On abdominal terg. II–IV five pairs of anterior setae (*A* 1, 2, 3, 4 and 5) present, but *A* 1, 2 and 3 on terg. V–VI absent; on terg. VII *A* 1, 2, 3 and 4 missing and *P* 1a short, not filiform, less than one-fifth of *P* 1 and situated in the same row as *P* 1 and 2; *P* 2 and 1'' on terg. VIII not displaced; setae 1, 2, and 3 on terg. X and setae 1, 2 on terg. XI absent. Female squama genitalis similar to that of *E. melanesiense*, but with latero-proximal sclerotization.

Maturus junior. Foretarsus 59–62 μ m; except for absence of setae 2 and 4 on abdominal stern. XI, important features such as foretarsal sensillae, chaetotaxy, etc., do not differ from those of adult.

Larva II. Foretarsus 52–53 μ m; position and shape of foretarsal sensillae as in *maturus junior*.

Chaetotaxy as in Table 7.



FIGS 47–50. *Eosentomon solare*. 47, 48, foretarsus, (47) interior and (48) exterior views; 49, female squama genitalis; 50, clypeal apodeme.

Holotype ♀, SOLOMON ISLANDS: Choiseul, Katurasele, 23.xii.1965 (*P. J. M. & P. Greenslade*) (BMNH).

Paratypes. BISMARCK ARCHIPELAGO: Dyaul, Sumuna, 11.iii.1962 (*Noona Dan Expedition*), 1 ♂, 1 ♀; D., Kollepine, 12.iii.1962 (*Noona Dan Expedition*), 2 ♀, 1 ♂; Duke of York, Manuan, 21.vii.1962 (*Noona Dan Expedition*), 4 ♂, 5 ♀, 1 ♂ (all UZM). SOLOMON ISLANDS: Choiseul, Katurasele, 23.xii.1965 (*P. J. M. & P. Greenslade*), 2 ♀; Russell, Yandina, 15.viii.1966 (*P. J. M. & P. Greenslade*), 1 ♀; Nggela, Soso, 2.xii.1965 (*P. J. M. & P. Greenslade*), 2 ♂, 2 ♀; Guadalcanal, Lunga, viii. 1966 (*P. J. M. & P. Greenslade*), 1 ♂, 5 ♀, 2 m.j.; Bellona, 28.v.1965 (*P. J. M. & P. Greenslade*), 1 ♀; Rennell, Kagaba Bay, 6.iv.1965 (*P. J. M. & P. Greenslade*), 1 ♀ (all BMNH).

TABLE 7

Chaetotaxy of *Eosentomon solare*

(Dorsal)	Formula	Composition of setae	(Ventral)	Formula	Composition of setae
Th.I	4	1,2	Th.I-II	$\frac{6-2}{6}$	<i>A</i> 1,2,3, <i>M</i>
II-III	$\frac{6}{16}$	<i>A</i> 2, 4, <i>M</i> <i>P</i> 1, 1 <i>a</i> , 2, 2 <i>a</i> , 3, 3 <i>a</i> , 4, 5	III	$\frac{6-4}{8}$	<i>A</i> 1,2,3, <i>M</i> 1,2 <i>P</i> 1, 2, 2 <i>a</i> , 3
Abd.I	$\frac{4}{10}$	<i>A</i> 1,2 <i>P</i> 1, 1 <i>a</i> , 2, 3, 4	Abd.I	$\frac{4}{4}$	<i>A</i> 1,2 <i>P</i> 1,2
II-IV	$\frac{10}{16}$	<i>A</i> 1,2,3,4,5 <i>P</i> 1, 1 <i>a</i> , 2, 2 <i>a</i> , 3, 4, 4 <i>a</i> , 5	II-III	$\frac{6}{4}$	<i>A</i> 1,2,3 <i>P</i> 1,2
V-VI	$\frac{4}{16}$	<i>A</i> 4,5 <i>P</i> 1, 1 <i>a</i> , 2, 2 <i>a</i> , 3, 4, 4 <i>a</i> , 5	IV-VII	$\frac{6}{10}$	<i>A</i> 1,2,3 <i>P</i> 1, 2, 2 <i>a</i> , 2 <i>a'</i> , 3
VII	$\frac{2}{16}$	<i>A</i> 5 <i>P</i> 1, 1 <i>a</i> , 2, 2 <i>a</i> , 3, 4, 4 <i>a</i> , 5	VIII	$\frac{0}{7}$	<i>P</i> <i>c</i> , 1, 1 <i>a</i> , 2
VIII	$\frac{6}{9}$		IX-X	4	1,2
IX	8	1,2,3,4	XI	8	
X	2	4	Telson	12	
XI	4	3,4			
Telson	9				

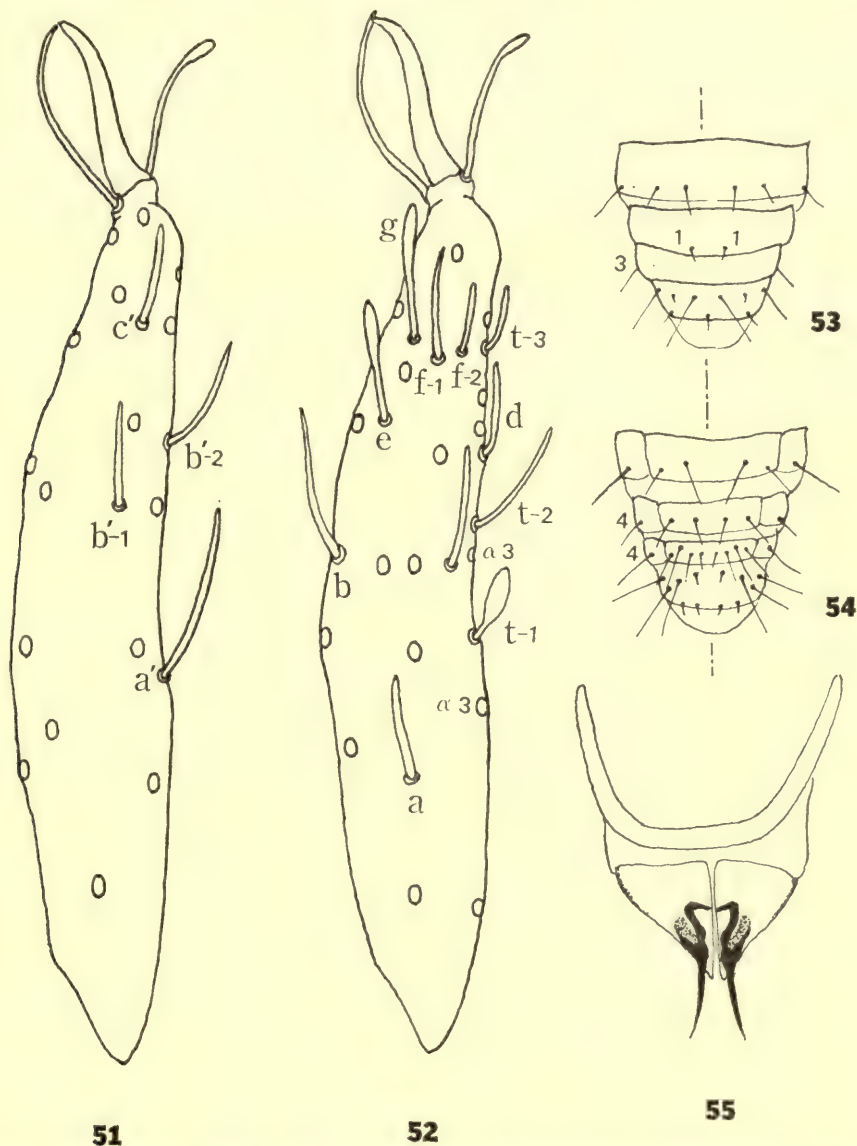
As mentioned in the description of the preceding species, the present species is very similar to *E. melanesiense*, *E. dawsoni* Condé and especially *E. wygodzinskyi* Bonet. From *E. melanesiense* it is distinguished by the presence of five pairs of anterior setae on abdominal terg. IV as well as by the presence of a latero-proximal sclerotization in the female squama genitalis. The shape of the caput processus of the female squama genitalis is different from that of *E. dawsoni*. The difference between *E. solare* and *E. wygodzinskyi*, such as the relative length of the filum processus of the female squama genitalis and of the foretarsal sensilla *c'*, may be significant, although these two forms closely resemble each other.

Eosentomon sakura Imadaté & Yosii

(Text-figs 51-55)

Eosentomon sakura Imadaté & Yosii, 1959 : 7, pl. 2, figs 8-10. Holotype ♀, JAPAN: Nara, Mt Yoshino, 30.vii.1954 (G. Imadaté) (KU).

Eosentomon sakura Imadaté & Yosii; Imadaté, 1974 : 261-268.



FIGS 51-55. *Eosentomon sakura*. 51, 52, foretarsus, (51) interior and (52) exterior views; 53, 54, chaetotaxy of abd. IX-XII, (53) dorsal and (54) ventral views; 55, female squama genitalis.

SPECIMENS EXAMINED.

BISMARCK ARCHIPELAGO: New Britain, Valoka, 13.vii.1962 (*Noona Dan Expedition*), 1 ♀, 1 I II, 1 I I (UZM). SOLOMON ISLANDS: Nggela, Vatilau, 14.vi.1965 (*P. J. M. & P. Greenslade*), 1 ♂; Savo, Koela, 1.vi.1965 (*P. J. M. & P. Greenslade*), 1 m.j.; Guadalcanal, Mt Austen, 11.ii.1966 (*P. J. M. & P. Greenslade*), 1 ♂, 1 ♀, 1 m.j. (all BMNH); G., Honiara, 4.viii.1962 (*Noona Dan Expedition*), 1 ♀, 1 m.j., 1 I II, 1 I I (UZM); San Christoval, Warahitor, 1.viii.1966 (*P. N. Lawrence*) (BMNH).

FURTHER DISTRIBUTION. Japan and Formosa.

As shown in Table 8 and Text-figs 51-55, the important specific features such as chaetotaxy, position and shape of foretarsal sensillae, structure of the female squama genitalis, etc. of the Melanesian specimens examined agree well with those of *E. sakura*. The measurements of the Melanesian specimens are as follows: foretarsus 83-87 μ m (adult), 74-76 μ m (maturus junior), 63-65 μ m (larva II) and 54-57 μ m (larva I), PR, TR, EU and BS in adults are 11-12, 5.0, 1.0 and 1.1-1.2 respectively.

E. collarum Yin from China and *E. imbutum* Imadaté from tropical Asia closely resemble *E. sakura*. Whether they are both really distinct from it will only be solved when a considerable number of specimens from different places in Asia are subjected to minute examination.

TABLE 8

Chaetotaxy of *Eosentomon sakura* from Melanesia

(Dorsal)			(Ventral)		
Formula	Composition of setae		Formula	Composition of setae	
Th.I	4	1,2	Th.I-II	$\frac{6-2}{6}$	A 1,2,3, M P 1,2,3
II-III	$\frac{6}{16}$	A 2,4, M P 1,1a,2,2a,3,3a,4,5	III	$\frac{6-4}{8}$	A 1,2,3, M 1,2 P 1,2,2a,3
Abd.I	$\frac{4}{10}$	A 1,2 P 1,1a,2,3,4	Abd.I	$\frac{4}{4}$	A 1,2 P 1,2
II-IV	$\frac{10}{16}$	A 1,2,3,4,5 P 1,1a,2,2a,3,4,4a,5	II-III	$\frac{6}{4}$	A 1,2,3 P 1,2
V-VI	$\frac{4}{16}$	A 4,5 P 1,1a,2,2a,3,4,4a,5	IV-VII	$\frac{6}{10}$	A 1,2,3 P 1,2,2a,2a',3
VII	$\frac{2}{16}$	A 5 P 1,1a,2,2a,3,4,4a,5	VIII	$\frac{0}{7}$	P c,1,1a,2
VIII	$\frac{6}{9}$		IX-X	4	1,2
IX	4	1,2,3,4	XI	8	
X	4	1,4	Telson	12	
XI	4	3,4			
Telson	9				

***Eosentomon solomonense* sp. n.**

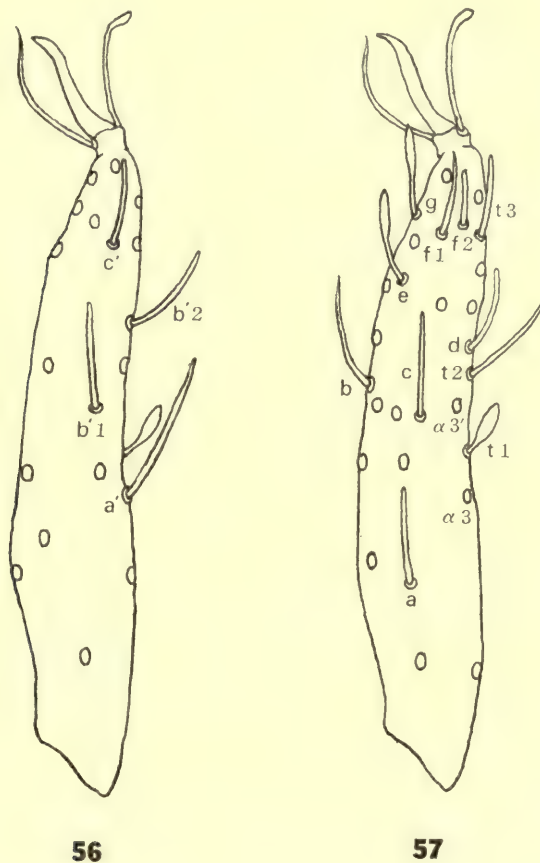
(Text-figs 56-60)

Body length 1000-1100 μ m in expanded adults.

Mouthparts normal; clypeal apodeme distinct; labral setae present; pseudoculus rather large, $PR = 8-9$.

Foretarsus 97-98 μ m in length, $TR = 5.4-5.8$ and $EU = 1.0$; position and shape of foretarsal sensillae similar to those of preceding species. Dorsal sensilla $t-1$ situated about halfway between $\alpha 3$ and $\alpha 3'$, $BS = 1.1$; apex of exterior sensilla a surpasses level of $\alpha 3$; interior sensilla $b'-1$ present. Empodium of hind tarsus short and less than one-fifth claw length.

Chaetotaxy (Table 9) similar to that of *E. gimangi* Imadaté from Borneo except for absence of $A 3$ on abdominal terg. IV; on terg. V-VI $A 1, 2$ and 3 absent; on terg. VII $P 1a$ situated at posterior margin with the other accessory setae and $A 1, 2, 3$ and 4 absent; $P 2$ and $1''$ not displaced anteriorly on terg. VIII; on terg. X-XI four pairs of tergal setae, $1, 2, 3$ and 4 present. Female squama genitalis similar to that of *E. melanesiense* and *sakura*.

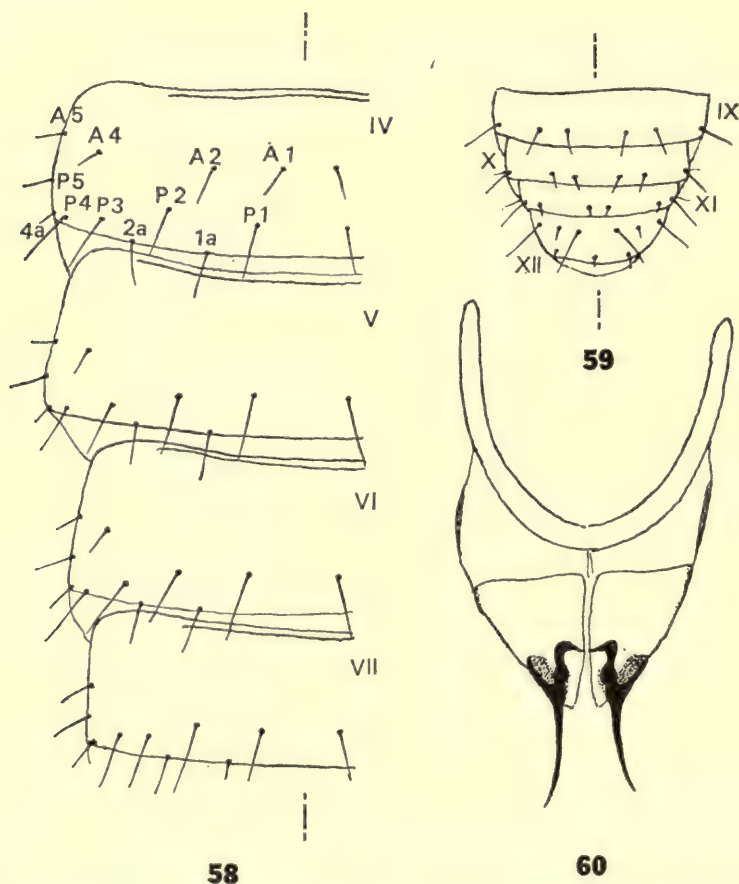


FIGS 56, 57. *Eosentomon solomonense*. Foretarsus, (56) interior and (57) exterior views.

Holotype ♂, SOLOMON ISLANDS: Guadalcanal, Mt Austen, 13.xi.1964 (*P. J. M. & P. Greenslade*) (BMNH).

Paratypes. SOLOMON ISLANDS: Mono, Falomai, 20.ix.1965 (*P. J. M. & P. Greenslade*), 1 ♂, 1 ♀; Wagina, 25.v.1966 (*P. J. M. & P. Greenslade*), 1 ♀; Nusatupe, Gizo, 4.vi.1965 (*P. J. M. & P. Greenslade*), 1 ♀; Nggela, Soso, 2.xii.1965 (*P. J. M. & P. Greenslade*), ? 1 ♀; Guadalcanal, Mt Austen, 13.xi.1964, 1 ♂, 11.ii.1966, 2 ♀ (all *P. J. M. & P. Greenslade*) (all BMNH).

This species is closely related to the preceding three species in many respects, e.g., the position and shape of the foretarsal sensillae, the structure of the female squama genitalis, etc., but it is different in the presence of four pairs of tergal setae on abdomen X–XI, in the absence of *A* 3 on terg. IV, in the position of *P* 1*a* on terg. VII and in the relative size of the pseudoculus. On the other hand, this species is also similar to *E. gimangi* Imadaté from Borneo, but it is distinguished



FIGS 58–60. *Eosentomon solomonense*. 58, 59, tergal chaetotaxy of (58) abd. IV–VII and (59) abd. IX–XII; 60, female squama genitalis.

from the latter by the relative length of foretarsal sensilla *a* and the size of pseudoculus as well as by the absence of *A* 3 on terg. IV.

One female specimen from Honiara, Guadalcanal, 4.viii.1962 (*Noona Dan Expedition*) is apparently a related form of this species, but it is rather small in size (foretarsus 60 μ m) and the chaetotaxy is consistent with that of *E. udorni* Imadaté from Thailand except for the presence of *A* 2 on abdominal terg. V-VI.

TABLE 9

 Chaetotaxy of *Eosentomon solomonense*

(Dorsal)	Formula	Composition of setae	(Ventral)	Formula	Composition of setae
Th.I	4	1,2	Th.I-II	$\frac{6-2}{6}$	<i>A</i> 1,2,3, <i>M</i>
II-III	$\frac{6}{16}$	<i>A</i> 2,4, <i>M</i> <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,3 <i>a</i> ,4,5	III	$\frac{6-4}{8}$	<i>A</i> 1,2,3, <i>M</i> 1,2 <i>P</i> 1,2,2 <i>a</i> ,3
Abd.I	$\frac{4}{10}$	<i>A</i> 1,2 <i>P</i> 1,1 <i>a</i> ,2,3,4	Abd.I	$\frac{4}{4}$	<i>A</i> 1,2 <i>P</i> 1,2
II-III	$\frac{10}{16}$	<i>A</i> 1,2,3,4,5 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	II-III	$\frac{6}{4}$	<i>A</i> 1,2,3 <i>P</i> 1,2
IV	$\frac{8}{16}$	<i>A</i> 1,2,4,5 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	IV-VII	$\frac{6}{10}$	<i>A</i> 1,2,3 <i>P</i> 1,2,2 <i>a</i> ,2 <i>a'</i> ,3
V-VI	$\frac{4}{16}$	<i>A</i> 4,5 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	VIII	$\frac{0}{7}$	<i>P</i> <i>c</i> ,1,1 <i>a</i> ,2
VII	$\frac{2}{16}$	<i>A</i> 5 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	IX-X	4	1,2
VIII	$\frac{6}{9}$		XI	8	
IX-XI	8	1,2,3,4	Telson	12	
Telson	9				

Eosentomon guadalcanalense sp. n.

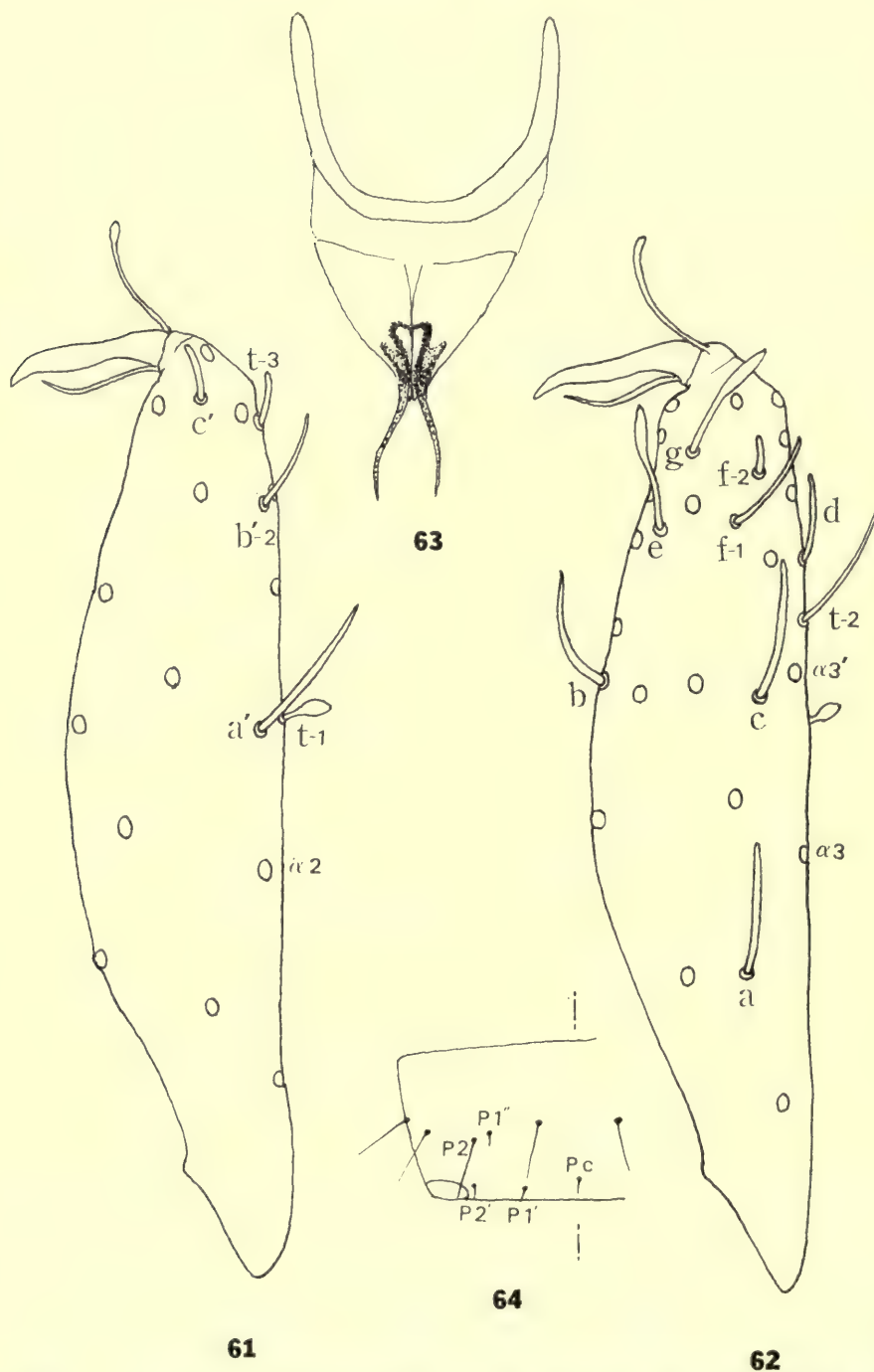
(Text-figs 61-64)

Body length 900-1200 μ m in expanded adults.

Mouthparts normal, but labral setae not visible; clypeal apodeme indistinct; pseudoculus of medium size, *PR* = 10.

Foretarsus 95 μ m in length, *TR* = 5.9 and *EU* = 0.8; position and shape of foretarsal sensillae similar to those of *E. imadatei* Tuxen from Australia; dorsal sensilla *t*-1 placed slightly proximally to α 3', *BS* = 1.4; *t*-2 is thin; *t*-3 rather small; exterior sensilla *a* normal and apex slightly surpassing level of α 3; *c* a little broadened, *f*-2 is short and situated distally to *f*-1; spatulate *e* and *g* normal; interior sensilla *a'* stout and placed almost level with *t*-1; *b'*-1 absent; *c'* relatively short. Empodium of hind tarsus short and less than one-fifth claw length.

Thoracic chaetotaxy normal. On abdominal terg. II-III, *P* 4*a* not visible; *A* 3 on terg. II-VI and *A* 1 and 3 on terg. VII absent; *P* 1*a* on terg. VII situated at posterior margin with



FIGS 61-64. *Eosentomon guadalcanalense*. 61, 62, foretarsus, (61) interior and (62) exterior views; 63, female squama genitalis; 64, chaetotaxy of abdominal terg. VIII.

the other accessory setae; $P\ 2$ and $1''$ on terg. VIII displaced anteriorly as shown in Text-fig. 64; two anterior setae present on stern. VIII. Female squama genitalis similar to that of *E. solare* and *solomonense*.

Maturus junior. Foretarsus $82\ \mu\text{m}$, $BS = 1.4$ and $TR = 5.8$; the specific characters such as position and shape of foretarsal sensillae, chaetotaxy (except for stern. XI), etc., similar to those of adult.

Larva I. Foretarsus $66\ \mu\text{m}$; position and shape of foretarsal sensillae similar to those of *maturus junior*.

Chaetotaxy as in Table 10.

Holotype ♀, SOLOMON ISLANDS: Guadalcanal, Lunga, viii. 1966 (*P. J. M. & P. Greenslade*) (BMNH).

Paratypes. Same data as holotype, 5 ♀, 1 m.j., 11 ♂.

E. guadalcanalense is similar to *E. imadatei* Tuxen from Australia, but differs from it in the displacement of $P\ 2$ and $1''$ on abdominal terg. VIII, in the presence of $A\ 1$ on terg. VI and in the shape of the corpus processus of female squama genitalis.

TABLE 10

 Chaetotaxy of *Eosentomon guadalcanalense*

(Dorsal)	Formula	Composition of setae	(Ventral)	Formula	Composition of setae
Th.I	4	1,2	Th.I-II	$\frac{6-2}{6}$	$A\ 1,2,3, M$ $P\ 1,2,3$
II-III	$\frac{6}{16}$	$A\ 2,4, M$ $P\ 1,1a,2,2a,3,3a,4,5$	III	$\frac{6-4}{8}$	$A\ 1,2,3, M\ 1,2$ $P\ 1,2,2a,3$
Abd.I	$\frac{4}{10}$	$A\ 1,2$ $P\ 1,1a,2,3,4$	Abd.I	$\frac{4}{4}$	$A\ 1,2$ $P\ 1,2$
II-III	$\frac{8}{14}$	$A\ 1,2,4,5$ $P\ 1,1a,2,2a,3,4,5$	II-III	$\frac{6}{4}$	$A\ 1,2,3$ $P\ 1,2$
IV-VI	$\frac{8}{16}$	$A\ 1,2,4,5$ $P\ 1,1a,2,2a,3,4,4a,5$	IV-VII	$\frac{6}{10}$	$A\ 1,2,3$ $P\ 1,2,2a,2a',3$
VII	$\frac{6}{16}$	$A\ 2,4,5$ $P\ 1,1a,2,2a,3,4,4a,5$	VIII	$\frac{2}{7}$	A $P\ c,1,1a,2$
VIII	$\frac{6}{9}$		IX-X	4	
IX-XI	8	1,2,3,4	XI	8	
Telson	9		Telson	12	

Eosentomon notiale sp. n.

(Text-figs 65-68)

Body length 670-750 μm in expanded adults.

Mouthparts normal; labral setae not visible, but clypeal apodeme distinct; pseudoculus of medium size, $PR = 10$.

Foretarsus 57-62 μm in length, $TR = 5.7-6.1$ and $EU = 0.8$; position and shape of foretarsal sensillae similar to those of *E. guadalcanalense*; dorsal sensilla $t-1$ placed slightly proximally

to $\alpha 3'$, $BS = 1.3$; interior sensilla a' situated about halfway between $\alpha 3$ and $\alpha 3'$; $b'-1$ absent. Empodium of hind tarsus distinctly elongate and more than one-third claw length.

Thoracic chaetotaxy normal. Abdominal terg. II–VI with five pairs of anterior setae; $A 1$ and 3 missing on terg. VII and $P 1a$ is situated at posterior margin with the other accessory setae; $P 2$ and $1''$ on terg. VIII displaced anteriorly; two anterior setae present on stern. VIII.

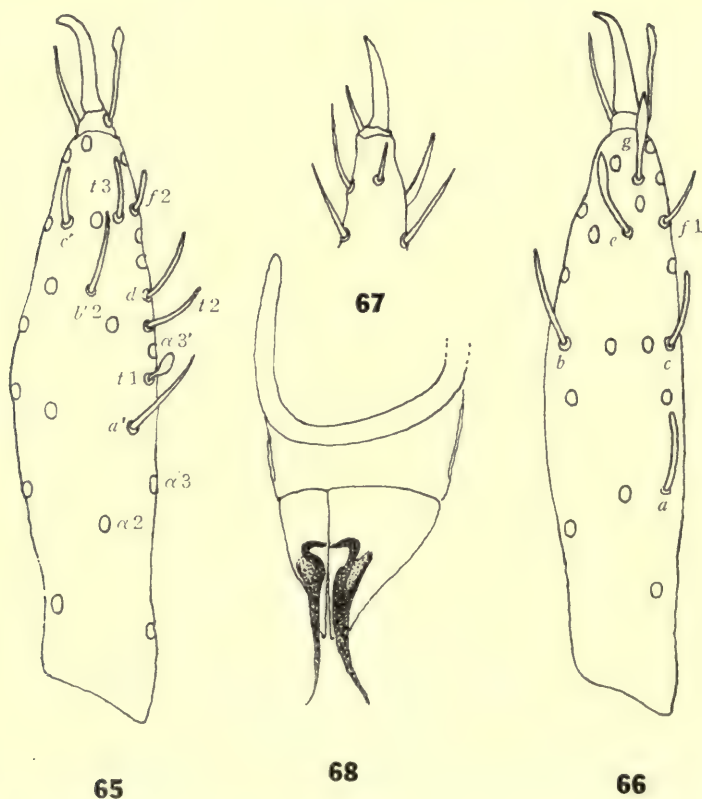
Female squama genitalis similar to that of the previous species.

Maturus junior. Foretarsus $48-50 \mu m$. Except for absence of setae 2 and 4 on abdominal stern. XI, the specific features such as chaetotaxy, position and shape of foretarsal sensillae similar to those of adult.

Chaetotaxy as in Table 11.

Holotype ♀, SOLOMON ISLANDS: Santa Isabel, Buala, 14.xii.1964 (P. J. M. & P. Greenslade) (BMNH).

Paratypes. SOLOMON ISLANDS: Santa Isabel, Buala, 14.xii.1964 (P. J. M. & P. Greenslade), 1 ♀; Guadalcanal, Mt Austen, 11.ii.1966, 1 ♂, 1 ♀, 10.viii.1966, 2 ♀ (all P. J. M. & P. Greenslade); G., Kukum, vi.–vii. 1966 (P. J. M. & P. Greenslade), 1 ♀ (all BMNH).



FIGS 65–68. *Eosentomon notiale*. 65, 66, foretarsus, (65) interior and (66) exterior views; 67, distal part of hindtarsus; 68, female squama genitalis.

This species is similar to the preceding species, *E. guadalcanalense*, in some important features such as the position of the foretarsal sensilla *t*-1 and the displacement of *P* 2 and 1" on abdominal terg. VIII as well as in the presence of anterior setae on stern. VIII, but it differs in the long empodium of the hind tarsus and in the position of the foretarsal sensilla *a'* as well as in body size.

TABLE II
Chaetotaxy of *Eosentomon notiale*

(Dorsal)			(Ventral)		
Formula	Composition of setae		Formula	Composition of setae	
Th.I	4	1,2	Th.I-II	$\frac{6-2}{6}$	<i>A</i> 1,2,3, <i>M</i> <i>P</i> 1,2,3
II-III	$\frac{6}{16}$	<i>A</i> 2,4, <i>M</i> <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,3 <i>a</i> ,4,5	III	$\frac{6-4}{8}$	<i>A</i> 1,2,3, <i>M</i> 1,2 <i>P</i> 1,2,2 <i>a</i> ,3
Abd.I	$\frac{4}{10}$	<i>A</i> 1,2 <i>P</i> 1,1 <i>a</i> ,2,3,4	Abd.I	$\frac{4}{4}$	<i>A</i> 1,2 <i>P</i> 1,2
II-VI	$\frac{10}{16}$	<i>A</i> 1,2,3,4,5 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	II-III	$\frac{6}{4}$	<i>A</i> 1,2,3 <i>P</i> 1,2
VII	$\frac{6}{16}$	<i>A</i> 2,4,5 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	IV-VII	$\frac{6}{10}$	<i>A</i> 1,2,3 <i>P</i> 1,2,2 <i>a</i> ,2 <i>a'</i> ,3
VIII	$\frac{6}{9}$		VIII	$\frac{2}{7}$	<i>A</i> <i>P</i> <i>c</i> ,1,1 <i>a</i> ,2
IX-XI	8	1,2,3,4	IX-X	4	1,2
Telson	9		XI	8	
			Telson	12	

The combination of unusual characters such as the position of *t*-1, the displacement of *P* 2 and 1" on terg. VIII and the long empodium of hind tarsus, etc., are also found in *E. saharense* Condé and *E. simile* Condé from Africa, although both African forms have *b'*-1 on the foretarsus.

One female specimen (foretarsus 50 μ m) and a larva II from New Britain, Valoka, 13.vii.1962 (*Noona Dan Expedition*) have similar chaetotaxy to this species, but the displacement of *P* 2 and 1" on terg. VIII and the long empodium of the hind tarsus are not present.

Eosentomon noonadanae sp. n.

(Text-figs 69-75)

Body length 800 μ m in the holotype.

Mouthparts normal, but not very protruded in the holotype; labral setae present; clypeal apodeme distinct; pseudoculus of medium size, *PR* = 11.

Foretarsus 63 μ m in length, *TR* = 5.7 and *EU* = 1.0; dorsal sensilla *t*-1 close to α 3, *BS* = 0.9; *t*-2 and *t*-3 normal; exterior sensilla *a* relatively short; *c* slightly broadened; spatulate

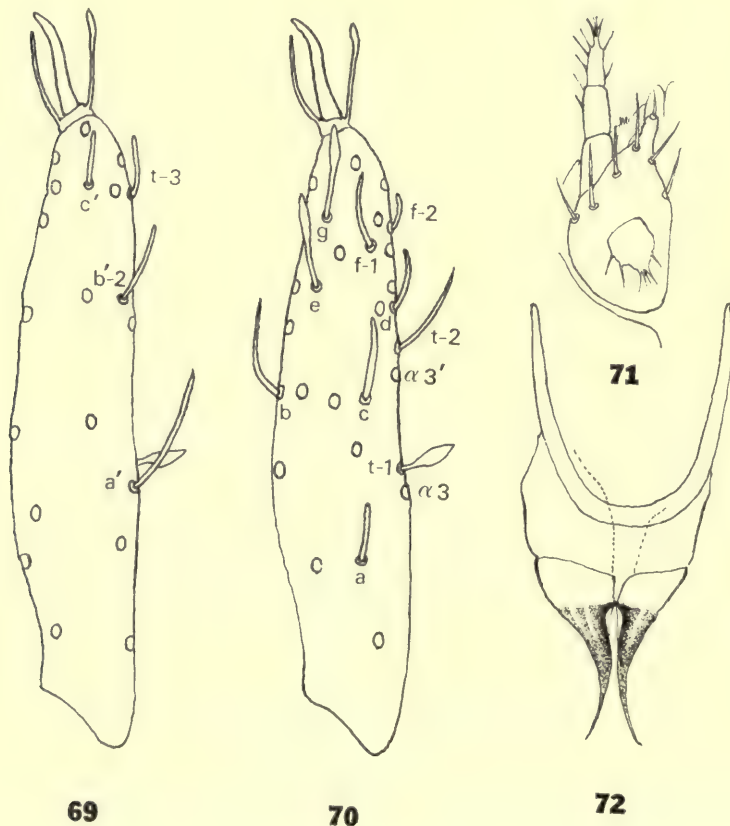
sensillae *e* and *g* present; interior sensilla *a'* stout; *b'-1* absent. Hind tarsal empodium short and less than one-fifth claw length.

Thoracic chaetotaxy normal. On abdominal terg. II-VI the principal setae, *P* 1, 3 and 4 on posterior row, placed at posterior margin in line with accessory setae *P* 1*a* and 2*a*, which are a little longer than the principal ones, but *P* 2 and 5 are situated distinctly anterior to the other posterior setae. *A* 2 and 3 on terg. III and *A* 2, 3 and 5 on terg. IV-VI lacking. On terg. VII, *P* 1, 2, 4 and 5 situated anterior to the other posterior setae, *P* 1*a*, 2*a*, 3 and 4*a*, and all anterior setae absent. *P* 2 and 1'' on terg. VIII not displaced. On abdominal stern. I-VII, the pair of *P* 1 missing and one central seta, *P*_c, is present instead of *P* 1; on stern. IV-VII, *A* 3 lacking.

Abdominal appendages I-III normal and provided with 5 setae each.

Female squama genitalis characterized by shape of caput processus, which is semi-circularly rounded, corpus processus divided by deep incisions and coalescent with lateral sclerotizations of stylus to form a broad structure terminating in the filum processus.

Chaetotaxy as in Table 12.

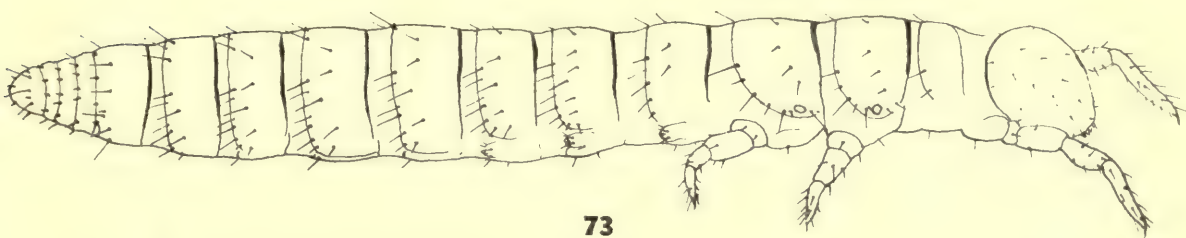


FIGS 69-72. *Eosentomon noonadanae*. 69, 70, foretarsus, (69) interior and (70) exterior views; 71, mouthparts, ventral view; 72, female squama genitalis.

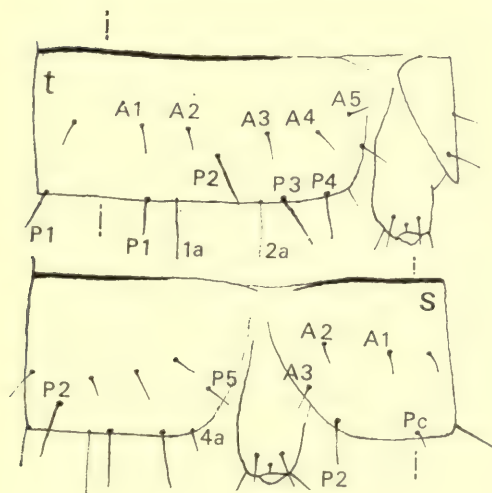
Holotype ♀, BISMARCK ARCHIPELAGO: New Britain, Valoka, 13.vii.1962 (*Noona Dan Expedition*) (UZM).

This species differs strikingly from all other eosentomids in the peculiar chaetotaxy of its abdominal segments, viz. the displacement of *P* 2 on abdominal terg. II–VI, the absence of *A* 3 on stern. IV–VII and of *P* 1 on stern. I–VII, the presence of a central seta, *P* c, on stern. I–VII, etc., and in the shape of the female squama genitales, which shows some slight similarity to that of *E. yosemitense* Ewing from California.

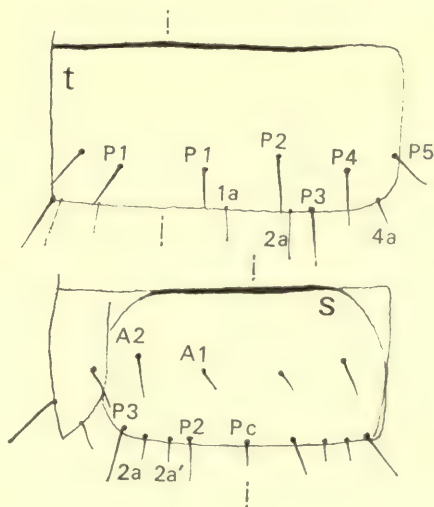
It seems likely that these characters are significant enough to establish a new genus, but we prefer not to describe it as such, since only one specimen is known.



73



74



75

FIGS 73–75. *Eosentomon noonadanae*. 73, dorsolateral view; 74, chaetotaxy of abd. II; 75, chaetotaxy of abd. VII (t = tergum, s = sternum).

TABLE 12

Chaetotaxy of *Eosentomon noonadanae*

(Dorsal)			(Ventral)		
Formula	Composition of setae		Formula	Composition of setae	
Th.I	4	1,2	Th.I-III	?	
II-III	$\frac{6}{16}$	<i>A</i> 2,4, <i>M</i> <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,3 <i>a</i> ,4,5	Abd.I	$\frac{4}{3}$	<i>A</i> 1,2 <i>P</i> <i>c</i> ,2
Abd.I	$\frac{4}{10}$	<i>A</i> 1,2 <i>P</i> 1,1 <i>a</i> ,2,3,4	II-III	$\frac{6}{3}$	<i>A</i> 1,2,3 <i>P</i> <i>c</i> ,2
II	$\frac{10}{16}$	<i>A</i> 1,2,3,4,5 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	IV-VII	$\frac{4}{9}$	<i>A</i> 1,2 <i>P</i> <i>c</i> ,2,2 <i>a</i> ,2 <i>a'</i> , 3
III	$\frac{6}{16}$	<i>A</i> 1,4,5 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	VIII	$\frac{0}{7}$	<i>Pc</i> ,1,1 <i>a</i> ,2
IV-VI	$\frac{4}{16}$	<i>A</i> 1,4 <i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	IX-X	$\frac{4}{8}$	1,2
VII	$\frac{0}{16}$	<i>P</i> 1,1 <i>a</i> ,2,2 <i>a</i> ,3,4,4 <i>a</i> ,5	XI		
VIII	$\frac{6}{9}$		Telson	12	
IX-XI	8				
Telson	9				

GENERAL DISCUSSION

ECOLOGY.

Very little can be said about the ecology, first of all because of the relatively small numbers of each species. For almost all habitats where its character is mentioned, be it for the Noona Dan or Greenslade collections, only 'litter and soil' is stated. According to Greenslade & Greenslade (1968) 'litter' refers to the upper, organic, litter and humus layers, and 'soil' to mineral material below. This is not very informative as to the whereabouts of the Protura, but we should think that they are found, as elsewhere, particularly in the uppermost 5 cm, the layer with a high organic content being shallow in tropical regions (Greenslade, 1969, and the authors' personal observations).

A little more may be said about the localities. Almost all the Noona Dan samples and most of the Greenslade samples are from lowland forest soil, but a few are from higher altitudes: Mt Austen on Guadalcanal (c. 300 m), Lemkamin on New Ireland (900 m), Mt Jonapau (1100 m) and Mt Popamanaseu on Guadalcanal (1500 m and 2100 m). On Mt Austen almost all the known species have been found; it is, in fact, the only locality for *Condeellum crucis*. But at higher altitudes only two species have been found, viz. *Eosentomon oceaniae* and *melanesiense*. These two are the commonest of all Proturan species mentioned in this paper and are found in almost all localities, highland and lowland. So it appears that a

special mountain fauna can be distinguished simply by only a few of the most eurytopic and widespread species being able to withstand the higher altitudes.

It might be considered wise to compare the fauna at different times of the year, though only *Eosentomon oceaniae* yields enough material of all stages for a tentative evaluation. The result is, as might have been expected, that all stages seem to be found all the year round. Further ecological information must await more thorough and methodical collecting.

ZOOGEOGRAPHY.

The distribution of the 13 species in the Bismarck Archipelago and Solomon Islands is shown in Table 13 (p. 372).

Only two of these species are known from outside the Bismarck-Solomon group: *Eosentomon oceaniae*, which is known from North Queensland, Australia, and *Eosentomon sakura*, known from Japan and Formosa and probably also China and Thailand. Both are widespread over the Bismarck-Solomon group, the first named being the commoner.

In his papers (1968; 1969) P. J. M. Greenslade proposes an origin of the Solomon fauna in New Guinea, spreading west to east via the Bismarck Archipelago. Further, he suggests that colonization has been from larger to smaller islands and depends on the width of the water gaps. He states possible ways of expansion and concludes (1969: 275) for the Solomon Islands that there is 'a high incidence of endemics on San Christoval' and that some 'taxa are restricted to two or more of the islands extending from Bougainville to Nggela'; also that there is a 'fauna size' (number of taxa) correlation with the area of the island.

Unfortunately the Proturan fauna of New Guinea is not known, but the material in the present collection (124 specimens from the Bismarck Archipelago and 326 from the Solomon Islands) might be thought sufficiently large and widespread (37 localities on 21 islands) to show or at least confirm some parts of Greenslade's propositions. This seems not to be the case.

There are four endemic species among the twelve. (1) *Condeellum crucis*, known from several specimens from only one locality on Guadalcanal. (2) *Berberentulus rennellensis*, known from three specimens from Rennell. (3) *Eosentomon guadalcanalense*, known from several specimens from only one locality (another) on Guadalcanal. (4) *Eosentomon noonadanae*, known from one specimen from New Britain. On the other hand San Christoval has only one species so far, viz. *Eosentomon sakura*, widespread in the area and beyond.

Almost all the species (ten of the thirteen) have been found on Guadalcanal. This leaves a special faunal element on Bougainville - Nggela out of the question, and it does not indicate a fauna size-area correlation either.

Two species show, however, an interesting distribution. (a) *Silvestridia solomonis* which was originally found on Guadalcanal in 1958; ten more specimens have been found during the present investigation from Guadalcanal, and an additional, single specimen on Ndeni of the Santa Cruz group to the far east of the Solomon Islands. It is furthermore the only species and specimen found on these islands. (b) *Berber-*

entulus buchi (several specimens) found on Mussau and (especially) New Britain of the Bismarck Archipelago, but not on the Solomon Islands in spite of the fairly large collection. On the other hand it is closely related to *Berberentulus rennellensis* from Rennell. Whether this confirms or not Greenslade's (1968 : 191) supposition of a Louisiade affinity of the Rennell fauna we are unable to say since the Proturan fauna of New Guinea, as mentioned above, and of the Louisiades is quite unknown, as is that of New Hebrides and New Caledonia. Such a relationship seems not to be upheld by various authors in the volumes of *The Natural History of Rennell*.

Concluding it may be said that there is a distinct faunal connection between the Bismarck Archipelago and the Solomon Islands, both faunas probably originating in East Asia, though links are also shown with the Australian fauna. Guadalcanal harbours the richest fauna and in addition has two endemics. It is probable that in forming these conclusions we have overstretched the amount of evidence available.

TAXONOMY.

Both as to number of species and number of specimens the family Eosentomidae by far outnumbers the two other families. This seems reasonable since, generally speaking, the *Eosentomon* species are eurytopic, whilst the other Protura are more exacting in their demands and are stenotopic (Tuxen, 1949). The differences

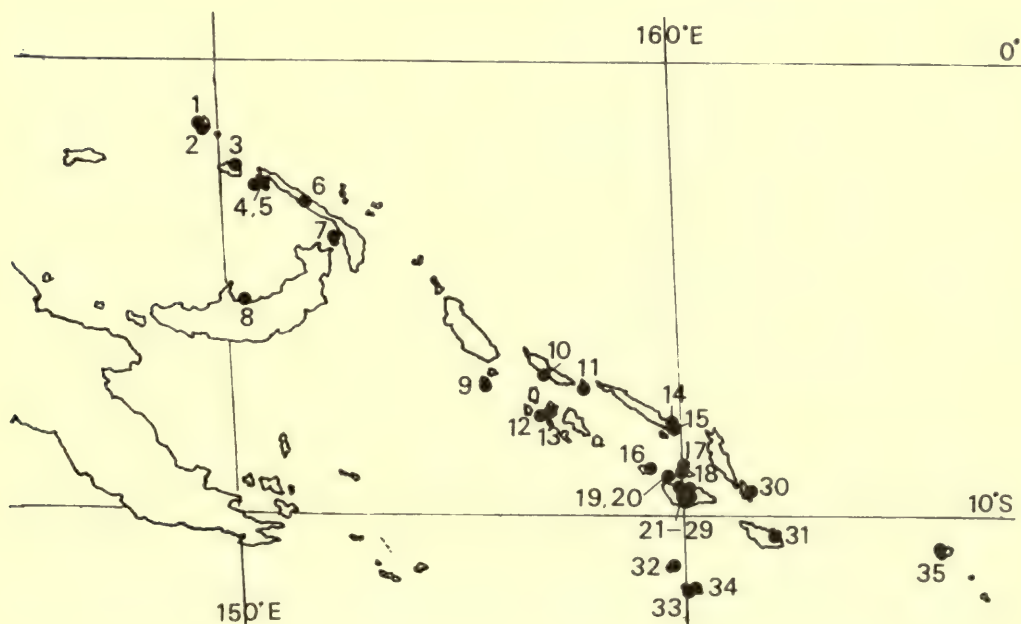


FIG. 76. Map showing the distribution of the collecting sites. The numbers correspond to those cited in the list of localities (p. 334).

between the majority of species within this genus are also smaller, often merely a matter of chaetotaxy, than in the other families, so a species relationship is in many cases difficult to state.

It is, however, interesting to note that some of the species here mentioned are fairly closely related *inter se*; this holds true, for example, of *Eosentomon melanesiense*, *solare*, *sakura*, and *solomonense*, forming as it seems a small group of their own. But this is not expressed in their geographical distribution where they do not always occur together nor do they always replace each other.

A curious tendency may be seen in the acerenomids, namely a convergence in the evolution of the foretarsal sensillae and the chaetotaxy in the four species of the three genera *Silvestridia*, *Berberentulus* and *Gracilentulus* of the present fauna. The position of the foretarsal sensillae *c* and *d* as well as the size of *a* and *b* are common to the four species of these three different genera and more or less different from other species of the same genera. Also a distinct reduction of anterior setae on the abdominal terga V–VIII is common to these four species. These common features are clearly due to convergence, but the reason is not obvious. It is likely that such convergence will be seen not only in morphological characters, but also in their biology.

It is also significant that no two (or more) acerenomids have been found coexisting at the same collecting site in this collection. There seems thus to be a distinct habitat segregation in the same way as it was shown for Japanese Protura (Imadaté, 1973).

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